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METAL-MINE ACCIDENTS
IN THE
UNITED STATES

DURING THE CALENDAR YEAR 1916

COMPILED BY

ALBERT H. FAY

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METAL-MINE ACCIDENTS DURING THE CALENDAR YEAR 1916.

Compiled by ALBERT H. FAY.

INTRODUCTION.

Returns received from the operators of metal mines for the year 1916 are extremely gratifying for two reasons—they show the lowest fatality rate and the largest number of men employed during the six years that the Bureau of Mines has been collecting metal-mine accident statistics. There were 936 more operators reporting than in 1915 and the number of employees showed an increase of 52,567 over the previous year, or 34.6 per cent. The number of days' work done during 1916 was 15,100,000 more than in 1915. As compared with the 1915 returns the percentage of increase in the number of employees in the different groups of mines is as follows: Copper mines, 30 per cent; gold and miscellaneous metal mines, 33 per cent; iron mines, 36 per cent; lead and zinc mines of the Mississippi Valley, 59 per cent, and the nonmetal mines, 27 per cent. In addition, the metallurgical works (not including iron and steel) reported 80,201 men in 1916 as compared with 49,891 in 1915.[a]

There were 697 fatalities reported for 1916, making the fatality rate 3.41 per 1,000 employees, as compared with 4.19 in 1911. The number of nonfatal injuries reported was 48,237 in 1916 as compared with 35,295 in the previous year, and the nonfatal injury rate per 1,000 employed was 235.66 as compared with 232.02. Although the fatality rate has decreased since 1911, the nonfatal injury rates have increased. This does not mean that metal mining is becoming more hazardous. The enactment of compensation laws and the establishment of better inspection service have resulted in mining companies keeping more complete records. It is believed that the foregoing nonfatal injury rate at metal mines is still lower than actually exists in this industry. This statement is borne out by the data compiled in Table 18, which shows details covering a period of three years compiled from the reports of representative companies at whose mines systematic records are being kept and a large amount of safety work is being done.

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[a] Fay, A. H. Accidents at metallurgical works, 1916: Tech. Paper 201. Bureau of Mines, 1918, 20 pp.

SCOPE OF STATISTICS.

In the compilation of the figures given in the following tables, which are derived from reports received from operators, the size of the mines was not considered, consequently the figures cover reports from prospectors, development companies, and producing mines. Although the Bureau of Mines is authorized to collect data on accidents at mines, there is no Federal law compelling operators to render such reports. However, the majority of the operators promptly and cheerfully replied to the bureau's requests for information. The tabulated statistics represent 5,258 operators who actually worked their mines during the year. As far as can be ascertained, all of the large companies made out detailed reports, so that, measured on the basis of production, the statistics are representative of the industry.

The tables in the following pages are arranged so as to represent five divisions of the mining industry, as follows:

Copper mines.—All of the copper mines and prospects that were reported in operation in the various copper-producing States are included in this group. The list represents 604 operators.

Gold, silver, and miscellaneous metal mines.—Here are the gold mines, both lode and placer, silver mines, lead-silver mines, gold-silver mines, the lead and zinc mines other than those in the Mississippi Valley, and mines working ores of quicksilver, manganese, tungsten, vanadium, chromium, etc. Pyrite mines are included, as the cinder is used in some metallurgical works for its iron and copper content, and also bauxite mines, because bauxite is the principal source of metallic aluminum. This group represents 3,921 operators, who reported their mines as active part or all of the year.

Iron mines.—All of the important iron mines, representing 199 operators, are included in this group.

Lead and zinc mines (Mississippi Valley).—The lead and zinc mines of the Mississippi Valley, represented by reports of 285 operators, are grouped together as representing an industry in which general conditions are similar.

Nonmetallic mineral mines.—The nonmetallic mineral mines, representing 249 operators, include those for asbestos, asphaltum, barite, feldspar, garnet, graphite, gypsum, kaolin, mica, phosphate rock, quartz, talc, salt, and soapstone. Coal mines are not included.

ACKNOWLEDGMENTS.

The Bureau of Mines gratefully acknowledges the assistance of the State mine inspectors and other officials of the various State mining departments, who have verified and corrected from their records, often at considerable time and trouble, the data reported to the bureau by the operators. Special mention should be made of the assistance rendered by the mine inspectors of Alaska, Arizona, Colorado, Idaho, Missouri, Nevada, and South Dakota, and the Industrial Accident Commission of California. To both the operators and the State mining officials the Bureau of Mines extends its thanks for their hearty cooperation. The author acknowledges the assistance rendered by R. H. Seip, W. W. Adams, and Miss Mary Bringhurst.

PUBLICATION OF ACCIDENT STATISTICS.

In publishing these statistics the Federal Bureau of Mines has no intent of encroaching on the field covered by the annual or biennial reports of State mine inspectors or mining departments. The bureau hopes, however, that the distribution of this information will help to establish a uniform basis for recording and reporting mine accidents, the number of men employed, and the number of days' work performed. When all mine-accident statistics are thus placed on the same basis, the making of comparisons and the drawing of conclusions will be rendered much easier.

As bearing on the difficulties that attend the compilation of comparable figures, attention is called to these facts. A number of States have no inspectors for metal mines. There is a lack of uniformity in the reports issued by the various States, as the fiscal years are not the same. The mines subject to inspection differ; in some States all mines are included, whereas in others only those mines employing 5, 10, or 20 men underground are included. Compensation laws in most States apply to all mines, but in some they are elective at the option of the operator.

In those States having an inspection service the fatality figures given herein were submitted to the various inspectors for verification, and from nearly all the bureau has received hearty cooperation. Only a few of the State inspectors collect complete statistics covering serious injuries, and still fewer give any attention to slight injuries, so that on these points it is impossible to check closely. Although the total number of deaths reported in the various States agrees closely with the inspectors' reports, there is some variation as to the classification.

The Bureau of Mines will be glad to receive suggestions from State inspectors, and from any person interested in mining, as to the form in which accident statistics can be presented most effectively and their publication made most useful to the mining industry.

CLASSIFICATION OF INJURIES.

As many of the States now have compensation laws, the bureau's classification of serious and slight injuries for 1915 and 1916 is on a 14-day (2-week) basis in order to conform to the classification used by the States. This classification of injuries includes three types, as follows:

Fatal, serious and slight injuries, 1915 and 1916.

Injury.	1915	1916
1. Fatal	553	697
2. Serious (time lost, more than 14 days):		
A. Permanent disability—		
Total [a]	35	44
Partial [b]	574	693
B. Others	7,242	10,099
3. Slight (time lost, 1 to 14 days, inclusive)	27,444	37,401
Total	35,295	48,237

[a] Permanent total disability: Loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.

[b] Permanent partial disability: Loss of one foot, leg, hand, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.

ACCIDENT STATISTICS BY GROUPS OF MINES.

COPPER MINES.

The figures in Tables 2, 4, and 6 are compiled from reports of 604 operators of copper mines that employed 61,228 men, of whom 43,215 worked underground and 18,013 on the surface. Of the 604 operators, 340 were working prospects and small mines in which less than 1,000 days' labor was performed. The other 264 worked mines where 1,000 or more days' labor was done.

The total number of deaths and injuries from accidents and the rates per 1,000 employed, as reported, are as follows: Deaths, 230, or 3.76 per 1,000 men employed, as compared with 3.73 for 1915; injuries, 20,168, or 329.39 per 1,000, as compared with 323.36 for 1915. Of the total number of fatalities, 188 were underground, making the rate 4.35 per 1,000 employed. The number of fatalities on the surface was 42, or 2.33 per 1,000.

The seemingly high rates of nonfatal injuries for this group of mines are not due so much to greater hazards as to copper mines being worked by well-organized companies, practically all of which have a safety department in charge of a competent engineer. In consequence, accurate records are kept, and it is believed that the records shown by both the copper and iron mines represent more nearly the actual hazard in the mining industry of the United States than do the records for any other group. This is also borne out by the data compiled in Table 17, under the caption of "mining methods," which include only those reports that indicate the keeping of reasonably complete records.

GOLD, SILVER, AND MISCELLANEOUS METAL MINES.

The data on accidents in and about the gold, silver, and miscellaneous metal mines, shown in Tables 2, 4, and 7 are compiled from the reports of 3,921 operators, employing 60,107 men, of whom 42,158 were employed underground and 17,949 on the surface. The number of deaths and injuries from accidents and the rates per 1,000 employed are as follows: Deaths, 217, or 3.61 per 1,000 men employed, as compared with 4.39 in 1915; injuries, 10,234, or 170.26 per 1,000, as compared with 184.87 for 1915. Of the total number of fatalities, 190 were underground, or 4.51 per 1,000 men employed underground, and 27 on the surface, or 1.50 per 1,000 men employed on the surface.

The rates of nonfatal injuries are low as compared with those at iron and copper mines. The difference may be explained largely by this group including many prospects and small mines that keep no records, and by many of the mines being in States where there is no inspection and the operators are not required to report accidents. At such mines any accidents that are not serious are forgotten, but fatal accidents are remembered and reported.

IRON MINES.

The figures on accidents at iron mines given in Tables 2, 4, and 8 are compiled from the reports of 199 iron-mine operators, who employed 53,488 men, of whom 30,485 were employed underground and 23,003, including those engaged in steam-shovel work, on the surface. The number of deaths and injuries from accidents in these mines is as follows: Deaths, 169, or 3.16 per 1,000 men employed, as compared with 2.61 in 1915; injuries 11,904, or 222.55 per 1,000 as compared with 211.65 in 1915. Of the total number of fatalities, 133 occurred underground, or 4.36 per 1,000 employed underground, and 36 employees were killed while engaged in surface work, making this rate 1.57 per 1,000 employed on the surface.

The injury rates at the iron mines, as at the copper mines, seem high; but, as already noted, the iron mines, like the copper mines, are operated by well-organized companies that conduct safety campaigns and keep excellent records of accidents. The accident hazard has not increased, but the well-kept records are showing the real hazard of the mining industry.

LEAD AND ZINC MINES.

Only the lead and zinc mines in the Mississippi Valley are included in this group. The lead and zinc mines of other States are grouped with "gold, silver, and miscellaneous metal mines" on account of the difficulty of making distinct classifications. In many places, for instance, in the lead-silver mines in the Coeur d'Alene district of Idaho, lead and zinc occur as associated metals in silver ores. The Mississippi Valley lead and zinc mines form a class by themselves and are easily segregated.

The figures given in Tables 2, 4, and 9 are compiled from the reports of 285 operators, employing 20,615 men, of whom 14,687 were employed underground and 5,928 on the surface. Of the 285 operators reporting, 60 operated small mines and prospects at each of which less than 1,000 days' labor was performed. The other 225 were operators of mines where 1,000 or more days' labor was performed.

The total number of deaths and injuries due to accidents as reported is as follows: Deaths, 57, or 2.76 per 1,000 men employed, as compared with 4.62 in 1915; injuries, 4,773, or 231.53 per 1,000, as compared with 205.06 in 1915. Of the total number of fatalities 52 occurred underground, making the rate 3.54 per 1,000 men employed below the surface. The surface fatalities were 5, or 0.84 per 1,000 employed on the surface.

NONMETALLIC MINERAL MINES.

Tables 2, 4, and 10 represent the reports of 249 operators of nonmetallic mineral mines. These mines employed 9,247 men, of whom 2,618 worked underground and 6,629 on the surface.

The total number of deaths and injuries reported as due to accidents is as follows: Deaths, 24, or 2.60 per 1,000 employed, as compared with 2.06 in 1915; injuries, 1,158, or 125.23 per 1,000, as compared with 91.69 in 1915. Compared with the nonfatal rates for the copper and iron mines, these ratios seem exceedingly low, but the reports indicate that this difference is largely explainable by the mines being small and not keeping complete records. About 75 per cent of the men are employed on the surface, the hazards being thus reduced to those of quarry operations. The figures for 1916 show a higher injury ratio than for previous years, indicating that more complete records are being kept.

ACCIDENT STATISTICS, BY STATES.

A compilation of the accident statistics, by States, is given in Tables 3, 5, 11, and 12, representing 5,258 operators employing 204,685 men, of whom 133,163 were employed underground and 71,522 on the surface. The total number of fatalities and injuries due to accidents is as follows: Deaths, 697, or 3.41 per 1,000 men employed, as compared with 3.64 in 1915; total number of injuries, 48,237, or 235.66 per 1,000 employed, as compared with 232.02 in 1915. Of the total number of fatalities, 574 occurred underground, or at the rate of 4.31 per 1,000 employed underground, and 123 were killed on the surface, or 1.72 per 1,000 employed on the surface.

The great irregularity of the injury ratio in different States is evident. The reason for this difference is shown by the extracts from State laws in Table 12.

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CAUSES AND DISTRIBUTION OF ACCIDENTS.

Tables 14, 24 and 26 show the percentage of deaths and injuries from any one cause in each group of mines and for all of the mines combined. It will be noted, for instance, that 28.69 per cent of the deaths in copper mines, and 23.59 per cent of the injuries were due to falls of rock or ore from roof or wall. A similar comparison may be made for any group of mines for any one of the 41 causes enumerated.

Of the fatalities (Table 24) 32.28 per cent resulted from falls of ore or rock from roof, wall, or bank; 14.64 per cent from falling down stope, shaft, winze, or bank; 12.77 per cent from explosives; and 10.04 per cent from haulage systems.

In Table 26 is given a summary of nonfatal injuries for the five-year period, 1911 to 1915, inclusive, by causes and the percentage due to each cause. The same table also shows comparative data for 1916.

TABULATED STATISTICS.

The tables of statistics of metal-mine accidents in the United States during the calendar year 1916 follow.

TABLE 1.—***ALL MINES:*** *Men employed, and number killed and injured per 1,000 employed, by kinds of mines, during the years ended Dec. 31, 1916 and 1915.*

Kind of mine	Active operators.	Men employed.			Number killed.						Number injured. (Time lost, more than 1 day.)						Widows.	Orphans.
		Underground.	On the surface.	Total.	Underground.[a]	Rate per 1,000 employed.	On the surface.	Rate per 1,000 employed.	**Total, underground and surface.**	Rate per 1,000 employed.	Underground.[a]	Rate per 1,000 employed.	On the surface.	Rate per 1,000 employed.	**Total, underground and surface.**	Rate per 1,000 employed.		
1916.																		
Copper	604	43,215	18,013	61,228	188	4.35	42	2.33	**230**	3.76	16,643	385.12	3,525	195.69	**20,168**	329.39	84	157
Gold, silver, and miscellaneous metal	3,921	42,158	17,949	60,107	190	4.51	27	1.50	**217**	3.61	8,325	197.47	1,909	106.36	**10,234**	170.26	71	116
Iron	199	30,485	23,003	53,488	133	4.36	36	1.57	**169**	3.16	9,246	303.30	2,658	115.55	**11,904**	222.55	88	222
Lead and zinc (Mississippi Valley)	285	14,687	5,928	20,615	52	3.54	5	.84	**57**	2.76	3,844	261.73	929	156.71	**4,773**	231.53	31	61
Nonmetallic mineral	249	2,618	6,629	9,247	11	4.20	13	1.96	**24**	2.60	391	149.35	767	115.70	**1,158**	125.23	11	18
Total or average	**5,258**	**133,163**	**71,522**	**204,685**	**574**	**4.31**	**123**	**1.72**	**697**	**3.41**	**38,449**	**288.74**	**9,788**	**136.85**	**48,237**	**235.66**	**285**	**574**
1915.																		
Copper	548	32,421	14,753	47,174	143	4.41	33	2.24	**176**	3.73	12,526	386.35	2,728	184.91	**15,254**	323.36	99	186
Gold, silver, and miscellaneous metal	3,120	29,163	16,149	45,312	168	5.76	31	1.92	**199**	4.39	6,990	239.69	1,387	85.89	**8,377**	184.87	77	133
Iron	191	23,302	16,089	39,391	78	3.35	25	1.55	**103**	2.61	6,631	284,57	1,706	106.04	**8,337**	211.65	67	127
Lead and zinc (Mississippi Valley)	241	9,493	3,484	12,977	54	5.69	6	1.72	**60**	4.62	2,370	249.66	291	83.52	**2,661**	205.06	23	28
Nonmetallic mineral	222	1,844	5,420	7,264	8	4.34	7	1.29	**15**	2.06	212	114.97	454	83.76	**666**	91.69	9	10
Total or average	**4,322**	**96,223**	**55,895**	**152,118**	**451**	**4.69**	**102**	**1.82**	**553**	**3.64**	**28,729**	**298.57**	**6,566**	**117.47**	**35,295**	**232.02**	**275**	**484**

[a] Includes shaft accidents.

TABLE 2.—*ALL MINES: Fatalities and injuries, by causes*

NUMBER KILLED.

Kind of mine.	Underground.									
	Fall of rock or ore from roof or wall.	Rock or ore while loading at working face.	Timber or hand tools.	Explosives.	Haulage accidents.	Falling down chute, winze, raise, or stope.	Run of ore from chute or pocket.	Drilling accidents.	Electricity.	Machinery (not including locomotives or drills).
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Copper	66	3	......	18	7	14	3	......	7	......
Gold, silver, and miscellaneous metal	66	5	1	28	9	13	4	......	5	1
Iron	53	1	1	15	16	12	3	......	3	......
Lead and zinc (Mississippi Valley)	27	1	......	10	1	1	1	......	1	1
Nonmetallic mineral	5	......	......	3	......	......	......	......	1	......
Total	**217**	**10**	**2**	**74**	**33**	**40**	**11**	......	**17**	**2**
Percentage of grand total killed	31.13	1.43	0.29	10.62	4.74	5.74	1.58	......	2.44	0.29
Percentage of class total killed	46.67	2.15	.43	15.91	7.16	8.60	2.36	......	3.65	.43
Number killed per 1,000 employed underground	1.63	.07	.02	.55	.25	.30	.08	......	.13	.02
NUMBER INJURED.										
Copper	4,758	2,484	2,078	280	2,070	495	658	723	25	133
Gold, silver, and miscellaneous metal	2,017	1,089	729	146	929	346	138	695	28	57
Iron	2,053	1,304	1,260	322	1,645	155	178	509	33	68
Lead and zinc (Mississippi Valley)	651	960	117	50	527	63	44	302	3	67
Nonmetallic mineral	56	114	11	12	55	1	......	24	......	7
Total	**9,535**	**5,951**	**4,195**	**810**	**5,226**	**1,060**	**1,018**	**2,253**	**89**	**332**
Percentage of grand total injured	19.77	12.34	8.70	1.68	10.83	2.20	2.11	4.67	0.18	0.69
Percentage of class total injured	25.63	16.00	11.27	2.18	14.05	2.85	2.74	6.05	.24	.89
Number injured per 1,000 employed underground	71.60	44.69	31.50	6.08	39.25	7.96	7.65	16.92	.67	2.49

and kinds of mines, during the year ended Dec. 31, 1916.

NUMBER KILLED.

Underground—Continued.						Shaft.						
Mine fires.	Suffocation from natural gases.	Inrush of water.	Stepping on nail.	Other causes.	**Total, underground.**	Falling down shafts.	Objects falling down shafts.	Breaking of cables.	Overwinding.	Skip or cage.	Other causes.	**Total, shaft.**
11	**12**	**13**	**14**	**15**		**16**	**17**	**18**	**19**	**20**	**21**	
23	1	......	......	8	**150**	17	2	......	......	13	6	**38**
4	4	......	......	10	**150**	16	6	2	2	11	3	**40**
......	1	1	1	4	**111**	8	7	......	......	7	......	**22**
......	......	......	1	......	**44**	4	3	......	......	1	......	**8**
......	......	......	......	1	**10**	......	......	......	......	1	......	**1**
27	**6**	**1**	**2**	**23**	**465**	**45**	**18**	**2**	**2**	**33**	**9**	**109**
3.87	0.86	0.14	0.29	3.30	**66.72**	6.46	2.58	0.29	0.29	4.73	1.29	**15.64**
5.81	1.29	.22	.43	4.95	**100.00**	41.29	16.51	1.83	1.83	30.28	8.26	**100.00**
.20	.05	(*a*)	.02	.17	**3.49**	.34	.13	.02	.02	.25	.06	**.82**

NUMBER INJURED.

2	13	......	237	2,391	**16,347**	41	89	......	1	**57**	108	**296**
5	16	1	213	1,542	**7,951**	56	91	4	3	108	112	**374**
......	6	3	178	1,231	**8,945**	24	62	......	2	112	101	**301**
14	3	......	115	668	**3,584**	9	101	1	1	81	67	**260**
......	......	......	7	90	**377**	2	4	......	......	2	6	**14**
21	**38**	**4**	**750**	**5,922**	**37,204**	**132**	**347**	**5**	**7**	**360**	**394**	**1,245**
0.04	0.08	0.01	1.55	12.28	77.13	0.27	0.72	0.01	0.01	0.75	0.82	**2.58**
.06	.10	.01	2.01	15.92	**100.00**	10.60	27.87	.40	.56	28.92	31.65	**100.00**
.16	.29	.03	5.63	44.47	**279.39**	.99	2.61	.04	.05	2.70	2.96	**9.35**

[a] Less than one-tenth of one per cent.

TABLE 2.—***ALL MINES:*** *Fatalities and injuries, by causes and*

NUMBER KILLED.

Kind of mine.	Surface (shops and power plants).									
	Mine cars, mine locomotives, or aerial trams.	Railway cars and locomotives.	Run or fall of ore in or from ore bins.	Falls of persons.	Stepping on nail.	Hand tools, axes, bars, etc.	Electricity.	Machinery.	Other causes.	**Total, surface.**
	22	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	
Copper	3	3	.....	4	.....	.....	1	5	5	**21**
Gold, silver, and miscellaneous metal	1	1	.....	3	.....	.....	5	2	13	**25**
Iron	5	1	1	6	1	.....	.....	2	4	**20**
Lead and zinc (Mississippi Valley)	.....	.....	.....	2	.....	.....	1	1	1	**5**
Nonmetallic mineral	.....	.....	1	.....	.....	1	.....	2	1	**5**
Total	**9**	**5**	**2**	**15**	**1**	**1**	**7**	**12**	**24**	**76**
Percentage of grand total killed	1.29	0.72	0.29	2.15	0.14	0.14	1.01	1.72	3.44	**10.90**
Percentage of class total killed	11.84	6.58	2.63	19.73	1.32	1.32	9.21	15.79	31.58	**100.00**
Number killed per 1,000 employed on the surface	.13	.07	.03	.21	.01	.01	.10	.17	.33	**1.06**
NUMBER INJURED.										
Copper	137	40	44	211	80	218	22	161	1,131	**2,044**
Gold, silver, and miscellaneous metal	134	28	19	131	88	179	15	145	552	**1,291**
Iron	131	69	20	176	87	216	10	151	661	**1,521**
Lead and zinc (Mississippi Valley)	34	25	30	102	96	93	6	98	376	**860**
Nonmetallic mineral	40	14	12	38	97	117	5	47	174	**544**
Total	**476**	**176**	**125**	**658**	**448**	**823**	**58**	**602**	**2,894**	**6,260**
Percentage of grand total injured	0.99	0.36	0.26	1.36	0.93	1.71	0.12	1.25	6.00	**12.98**
Percentage of class total injured	7.60	2.81	2.00	10.51	7.16	13.15	.93	9.61	46.23	**100.00**
Number injured per 1,000 employed on the surface	6.66	2.46	1.75	9.20	6.26	11.51	.81	8.42	40.46	**87.53**

kinds of mines, during the year ended Dec. 31, 1916—Continued.

NUMBER KILLED.

Open pit.												Grand total.					
Falls or slides of rock or ore.	Explosives.	Haulage accidents (locomotives, etc.).	Steam shovels.	Falls of persons.	Falls of derricks, booms, etc.	Run or fall of ore in or from ore bins.	Machinery (other than locomotives or steam shovels).	Electricity.	Hand tools.	Other causes.	Total, open pit.						
31	32	33	34	35	36	37	38	39	40	41		1916	1915	1914	1913	1912	1911
5	6	7	.....	.....	.....	.....	.....	1	.....	2	21	230	176	165	236	239	238
.....	.....	1	.....	.....	.....	.....	1	.....	.....	.....	2	217	199	179	210	176	193
2	6	5	1	.....	1	.....	.....	.....	.....	1	16	169	103	148	165	172	197
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	57	60	40	42	54	43
1	3	.....	.....	2	.....	.....	.....	1	.....	1	8	24	15	27	30	20	24
8	15	13	1	2	1	.....	1	2	.....	4	47	697	553	559	683	661	695
1.15	2.15	1.87	0.14	0.29	0.14	.....	0.14	0.29	.....	0.57	6.74	100.00	......	......	......	......	......
17.02	31.91	27.66	2.13	4.26	2.13	.....	2.13	4.26	.....	8.51	100.00	......	......	......	......	......	......
.11	.21	.18	.01	.03	.01	.....	.01	.03	.....	.06	.66	3.41	3.64	3.54	3.57	3.91	4.19

NUMBER INJURED.

316	8	111	36	46	2	1	27	3	79	852	1,481	20.168	15,254	13,367	13,363	13,637	10,342
36	4	11	.....	84	.....	.....	137	2	110	234	618	10,234	8,377	5,601	3,855	3,793	3,618
145	40	200	144	93	3	10	26	4	123	349	1,137	11,904	8,337	8,773	13,473	10,507	10,722
13	1	25	2	3	.....	3	1	....	5	16	69	4. 773	2,661	1,751	1,436	1,996	1,488
31	7	30	4	21	.....	6	17	3	30	74	223	1,158	666	724	844	801	407
541	60	377	186	247	5	20	208	12	347	1,525	3,528	48,237	35,295	30,216	32,971	30,734	26,577
1.12	0.13	0.78	0.39	0.51	0.01	0.04	0.43	0.02	0.72	3.16	7.31	100 00	......	......	......	......	......
15.33	1.71	10.69	5.27	7.00	0.14	0.57	5.89	0.34	9.83	43.23	100.00	......	......	......	......	......	......
7.56	.84	5.27	2.61	3.45	.07	.28	2.91	.17	4.85	21.32	49.33	235.66	232.02	191.10	172.37	181.65	160.13

Original from PRINCETON UNIVERSITY

TABLE 3.—*ALL MINES: Fatalities, by causes*

State.	Underground.									
	Fall of rock or ore from roof or wall.	Rock or ore while loading at working face.	Timber or hand tools.	Explosives.	Haulage accidents.	Falling down chute, winze, raise, or stope.	Run of ore from chute or pocket.	Drilling accidents.	Electricity.	Machinery (not including locomotives or drills).
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Alabama	9			3	5	3			1	
Alaska	10			3		3	1			
Arizona	22	1		14	3	8	1		1	
Arkansas										
California[a]	12			8	4				1	
Colorado	19	1	1	7	4	4	2		1	
Connecticut										
Florida										
Georgia	1									
Idaho	5	1		3	1				1	
Illinois	2						1			
Iowa				1						
Kansas	2									
Kentucky										
Maine										
Maryland										
Massachusetts										
Michigan	46	3	1	6	4	7			3	
Minnesota	10			5	3	1	1			
Missouri	12	1		8	1	1			1	1
Montana	21	1		1	2	4	1		5	
Nevada	7	1		5		2				1
New Hampshire										
New Jersey	2			3						
New Mexico	1	1				2	2		1	
New York	5			3	3	1			1	
North Carolina										
Ohio									1	
Oklahoma	2			2						
Oregon										
Pennsylvania	2									
South Carolina										
South Dakota	6									
Tennessee	2			1		2				
Texas						1				
Utah	6				2					
Vermont	1									
Virginia										
Washington	1			1						
Wisconsin	11				1	1	2			
Wyoming										
Other States										
Total 1916	**217**	**10**	**2**	**74**	**33**	**40**	**11**		**17**	**2**
Total 1915	191	10	7	72	18	45	10	1	10	
Total 1914	185	7	3	49	31	48	5	3	8	1
Total 1913	220	10	8	77	35	52	10		16	4
Total 1912	212	2	6	73	35	43	10	2	19	2
Total 1911	191		10	62	20	47	14		15	10

[a] See special paragraph, p. 84.

and States, during the year ended Dec. 31, 1916.

Underground—Continued.						Shaft.						
Mine fires. 11	Suffocation from natural gases. 12	Inrush of water. 13	Stepping on nail. 14	Other causes. 15	**Total, underground.**	Falling down shafts. 16	Objects falling down shafts. 17	Breaking of cables. 18	Overwinding. 19	Skip or cage. 20	Other causes. 21	**Total, shaft.**
......	......	......	......	......	**21**	......	1	......	......	1	......	**2**
......	......	......	......	1	**18**	3	......	......	......	2	1	**6**
2	1	......	......	2	**55**	4	......	......	......	1	2	**7**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	3	**28**	5	......	2	......	......	1	**8**
......	......	......	......	2	**41**	4	3	......	2	3	......	**12**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	**1**	......	1	......	......	......	......	**1**
......	......	......	......	1	**12**	1	......	......	......	2	......	**3**
......	......	......	......	......	**3**	......	......	......	......	......	......	......
......	......	......	......	......	**1**	......	......	......	......	......	......	......
......	......	......	......	1	**3**	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	1	1	......	5	**77**	14	6	......	......	16	......	**36**
......	......	......	1	1	**22**	......	1	......	......	1	......	**2**
......	......	......	1	......	**26**	4	2	......	......	......	......	**6**
21	2	......	......	4	**62**	4	2	......	......	......	1	**7**
4	......	......	......	......	**20**	1	......	......	......	2	2	**5**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	**5**	1	......	......	......	......	......	**1**
......	2	......	......	......	**9**	......	1	......	......	......	......	**1**
......	......	......	......	1	**14**	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	**1**	......	......	......	......	......	......	......
......	......	......	......	......	**4**	1	......	......	......	......	......	**1**
......	......	......	......	......	......	1	......	......	......	......	......	**1**
......	......	......	......	......	**2**	......	......	......	......	1	......	**1**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	**6**	......	......	......	......	......	......	......
......	......	......	......	......	**5**	......	1	......	......	1	......	**2**
......	......	......	......	......	**1**	......	......	......	......	......	......	......
......	......	......	......	2	**10**	1	......	......	......	1	2	**4**
......	......	......	......	......	**1**	......	......	......	......	1	......	**1**
......	......	......	......	......	......	......	......	......	......	1	......	**1**
......	......	......	......	......	**2**	......	......	......	......	......	......	......
......	......	......	......	......	**15**	1	......	......	......	......	......	**1**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
27	**6**	**1**	**2**	**23**	**465**	**45**	**18**	**2**	**2**	**33**	**9**	**109**
......	3	3	1	3	**374**	34	13	2	1	20	7	**77**
10	1	8	......	7	**366**	34	10	2	......	43	11	**100**
......	3	......	......	23	**458**	26	15	2	3	34	10	**90**
1	4	5	......	8	**422**	40	12	2	......	37	9	**100**
37	8	12	......	10	**436**	57	18	4	......	......	27	**106**

TABLE 3.—*ALL MINES: Fatalities, by causes and*

State.	Surface.									
	Mine cars, mine locomotives, or aerial trams. 22	Railway cars and locomotives. 23	Run or fall of ore in or from ore bins. 24	Falls of persons. 25	Stepping on nail. 26	Hand tools, axes, bars, etc. 27	Electricity. 28	Machinery. 29	Other causes. 30	**Total, surface.**
Alabama	1							2	1	**4**
Alaska		1		1			2		1	**5**
Arizona	1	1						1	1	**4**
Arkansas	1									**1**
California		1							4	**5**
Colorado				1			3		5	**9**
Connecticut										
Florida										
Georgia										
Idaho										
Illinois								1		**1**
Iowa										
Kansas										
Kentucky										
Maine										
Maryland										
Miassachusetts										
Michigan	4	2		4				1	1	**12**
Minnesota	1		1	4	1				2	**9**
Mossouri				1					1	**2**
Mentana	1							4	1	**6**
Nevada				1						**1**
New Hampshire										
New Jersey				1						**1**
New Mexico							1	1	2	**4**
New York								1		**1**
North Carolina										
Ohio										
Oklahoma										
Oregon										
Pennsylvania										
South Carolina										
South Dakota										
Tennessee							1	1	1	**3**
Texas									1	**1**
Utah									2	**2**
Vermont										
Virginia			1	1						**2**
Washington									1	**1**
Wisconsin				1						**1**
Wyoming										
Other States						1				**1**
Total 1916	**9**	**5**	**2**	**15**	**1**	**1**	**7**	**12**	**24**	**76**
Total 1915	**4**	**7**	**2**	**3**			**1**	**6**	**25**	**48**
Total 1914	**3**	**7**	**5**	**4**			**6**	**4**	**8**	**37**
Total 1913	**9**	**4**	**2**	**5**	**1**		**5**	**11**	**12**	**49**
Total 1912	**6**	**5**	**2**	**6**			**5**	**11**	**24**	**59**
Total 1911	**4**	**8**	**3**				**2**	**8**	**42**	**67**

States, during the year ended Dec. 31, 1916—Continued.

Open pit.												Grand total.					
Falls or slides of rock or ore.	Explosives.	Haulage accidents (locomotives, etc.).	Steam shovels.	Falls of persons.	Falls of derricks, booms, etc.	Run or fall of ore in or from ore bins.	Machinery (other than locomotives or steam shovels).	Electricity.	Hand tools.	Other causes.	Total, open pit.						
31	32	33	34	35	36	37	38	39	40	41		1916	1915	1914	1913	1912	1911
....	....	....	....	....	....	....	....	....	....	....	....	27	12	25	22	23	10
....	....	....	....	....	....	....	....	....	....	....	....	29	22	19	25	21	....
1	1	....	....	....	....	....	....	....	....	....	2	68	41	63	86	67	70
....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	1	2
....	....	....	....	....	....	....	1	....	....	....	1	42	49	41	52	40	38
....	....	....	....	....	....	....	....	1	....	....	1	63	49	47	41	48	43
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	9
....	2	....	....	1	....	....	....	....	....	1	4	4	3	10	14	6	....
1	....	....	....	1	....	....	....	....	....	....	2	4	1	1	1	....	2
....	....	....	....	....	....	....	....	....	....	....	....	15	25	25	24	29	23
....	....	....	....	....	....	....	....	....	....	....	....	4	3	....	1	1	1
....	....	....	....	....	....	....	....	....	....	....	....	1	2	....	....	....	1
....	....	....	....	....	....	....	....	....	....	....	....	3	2	1	4	2	2
....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	1	3
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	1	2	....	....	....	....	....	....	....	....	3	128	99	99	82	96	134
1	3	3	1	....	....	....	....	....	....	1	9	42	36	43	63	50	76
....	....	....	....	....	1	....	....	....	....	....	1	35	44	25	34	36	38
....	....	....	....	....	....	....	....	....	....	....	....	75	62	39	64	50	62
1	....	2	....	....	....	....	....	....	....	1	4	30	18	22	25	34	50
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....
....	....	1	....	....	....	....	....	....	....	....	1	8	9	4	8	13	23
....	4	3	....	....	....	....	....	....	....	....	7	21	4	5	28	13	11
....	1	....	....	....	....	....	....	....	....	....	1	16	8	11	11	17	10
....	....	....	....	....	....	....	....	....	....	....	....	....	....	8	4	1	4
....	....	....	....	....	....	....	....	....	....	....	....	1	2	....	....	1	....
....	....	....	....	....	....	....	....	....	....	....	....	5	4	3	1	2	....
....	....	....	....	....	....	....	....	....	....	....	....	1	2	1	3	1	2
1	....	....	....	....	....	....	....	....	....	....	1	4	1	....	....	2	1
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	6	6	4	8	6	8
....	1	....	....	....	....	....	....	....	....	....	1	11	8	18	10	12	10
....	....	....	....	....	....	....	....	....	....	....	....	2	1	....	1	....	....
3	1	2	....	....	....	....	....	1	....	1	8	24	23	29	36	41	49
....	....	....	....	....	....	....	....	....	....	....	....	2	1	....	1	2	....
....	....	....	....	....	....	....	....	....	....	....	....	3	1	2	12	4	6
....	....	....	....	....	....	....	....	....	....	....	....	3	4	....	4	4	3
....	....	....	....	....	....	....	....	....	....	....	....	17	8	11	11	22	3
....	1	....	....	....	....	....	....	....	....	....	1	1	2	....	....	4	....
....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	1	....	1
8	15	13	1	2	1	....	1	2	....	4	47	697	....	....	....	....	....
12	6	19	1	6	1	....	2	3	....	4	54	....	553	....	....	....	....
18	11	9	1	4	1	....	5	3	....	4	56	....	....	559	....	....	....
17	12	30	2	1	1	....	10	5	....	8	86	....	....	....	683	....	....
16	21	20	4	3	2	....	6	1	....	7	80	....	....	....	....	661	....
35	16	21	1	3	1	....	3	....	....	6	86	....	....	....	....	....	695

TABLE 4.—***FATALITIES:*** *By kinds of mines, causes, and*

COPPER MINES.

State.	Underground.									
	Fall of rock or ore from roof or wall.	Rock or ore while loading at working face.	Timber or hand tools.	Explosives.	Haulage accidents.	Falling down chute, winze, raise, or stope.	Ru of ore from chute or pocket.	Drilling accidents.	Electricity.	Machinery (not including locomotives or drills).
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Alaska	2					1	1			
Arizona	18	1		10	3	5	1		1	
California	4			2						
Idaho	1									
Michigan	20	2		3		1			2	
Montana	16			1	2	4	1		4	
Nevada	1			2						
New Mexico	1					1				
Utah	2				2					
Washington										
Other States	1					2				
Total 1916	**66**	**3**		**18**	**7**	**14**	**3**		**7**	
Total 1915	69	2	4	16	5	13	2		5	
Total 1914	57	2	1	14	10	22	4	1	5	
Total 1913	76	2	1	23	20	25	6		6	
Total 1912	87		4	21	9	16	6	1	9	
Total 1911	82		6	18	5	19	6		6	3

GOLD, SILVER, AND MISCELLANEOUS METAL MINES.

State.	1	2	3	4	5	6	7	8	9	10
Alaska	8			3		2				
Arizona	4			4		3				
California	8			6	4				1	
Colorado	19	1	1	7	4	4	2		1	
Georgia	1									
Idaho	4	1		3	1				1	
Montana	5	1							1	
Nevada	4	1		3		2				1
New Mexico		1				1	2		1	
North Carolina										
Oregon										
South Dakota	6									
Tennessee										
Utah	4									
Virginia										
Washington	1			1						
Wyoming										
Other States	2			1		1				
Total 1916	**66**	**5**	**1**	**28**	**9**	**13**	**4**		**5**	**1**
Total 1915	49	4	2	37	7	23	5	1	4	
Total 1914	52	1		22	6	21	1	2	3	
Total 1913	68	1	3	35	2	21	2		5	4
Total 1912	49	1	1	27	7	17	2		5	
Total 1911	40		2	24	7	18	6		7	5

States during the year ended Dec. 31, 1916—Continued.

COPPER MINES.

Underground—Continued.						Shaft.						
Mine fires.	Suffocation from natural gases.	Inrush of water.	Stepping on nail.	Other causes.	**Total, underground.**	Falling down shafts.	Objects falling down shafts.	Breaking of cables.	Overwinding.	Skip or cage.	Other causes.	**Total, shaft.**
11	**12**	**13**	**14**	**15**		**16**	**17**	**18**	**19**	**20**	**21**	.
......	......	......	......	......	**4**	1	......	......	......	1	**1**	**3**
2	1	......	......	2	**44**	3	......	......	......	......	**1**	**4**
......	......	......	......	......	**6**	......	......	......	......	......	......	......
......	......	......	......	......	**1**	1	......	......	......	......	......	**1**
......	......	......	......	3	**31**	7	1	......	......	12	......	**20**
21	......	......	......	3	**52**	4	1	......	......	......	1	**6**
......	......	......	......	......	**3**	1	......	......	......	......	1	**2**
......	......	......	......	......	**2**	......	......	......	......	......	......	......
......	......	......	......	......	**4**	......	......	......	......	......	2	**2**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	**3**	......	......	......	......	......	......	......
23	**1**	......	......	8	150	17	2	......	......	13	6	**38**
......	......	......	1	2	119	8	3	1	1	9	2	**24**
2	......	......	......	1	119	8	2	......	......	15	3	**28**
......	......	......	......	12	171	9	7	......	1	9	6	**32**
......	1	......	......	3	157	11	2	......	......	14	1	**28**
12	2	......	......	1	160	17	5	......	......	......	17	**39**

GOLD, SILVER, AND MISCELLANEOUS METAL MINES.

......	......	......	......	1	**14**	2	......	......	......	1	......	**3**
......	......	......	......	......	**11**	1	......	......	......	1	1	**3**
......	......	......	......	3	**22**	5	......	2	......	......	1	**8**
......	......	......	......	2	**41**	4	3	......	2	3	......	**12**
......	......	......	......	......	**1**	......	1	......	......	......	......	**1**
......	......	......	......	1	**11**	......	......	......	......	2	......	**2**
......	2	......	......	1	**10**	......	1	......	......	......	......	**1**
4	......	......	......	......	**15**	......	......	......	......	2	1	**3**
......	2	......	......	......	**7**	......	1	......	......	......	......	**1**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	1	......	......	......	......	......	**1**
......	......	......	......	......	**6**	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	2	**6**	1	......	......	......	1	......	**2**
......	......	......	......	......	......	......	......	......	......	1	......	**1**
......	......	......	......	......	**2**	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	**4**	2	......	......	......	......	......	**2**
4	**4**	......	......	**10**	**150**	**16**	**6**	**2**	**2**	**11**	**3**	**40**
......	2	......	......	......	134	19	6	......	......	6	3	**34**
4	1	......	......	3	116	13	2	2	......	19	2	**38**
......	3	......	......	6	150	10	5	......	......	13	2	**30**
1	3	......	......	1	114	16	2	2	......	10	3	**33**
17	5	......	......	2	133	16	8	3	......	......	3	**30**

TABLE 4.—***FATALITIES:*** *By kinds of mines, causes, and*

COPPER MINES.

State.	Surface.									
	Mine cars, mine locomotives, or aerial trams.	Railway cars and locomotives.	Run or fall of ore in or from ore bins.	Falls of persons.	Stepping on nail.	Hand tools, axes, bars, etc.	Electricity.	Machinery.	Other causes.	**Total, surface.**
	22	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	
Alaska										
Arizona	1	1						1		**3**
California		1							3	**4**
Idaho										
Michigan	1	1		3				1		**6**
Montana	1							2		**3**
Nevada				1						**1**
New Mexico							1	1	1	**3**
Utah									1	**1**
Washington										
Other States										
Total 1916	**3**	**3**		**4**			**1**	**5**	**5**	**21**
Total 1915	1	3		2		16		1	1	**24**
Total 1914	2	2		1					3	**8**
Total 1913	1	2					2	3	1	**9**
Total 1912	1	5		4			3	3	15	**31**
Total 1911		3	1				1	3	14	**22**

GOLD, SILVER, AND MISCELLANEOUS METAL MINES.

State.	22	23	24	25	26	27	28	29	30	Total, surface.
Alaska		1		1			2		1	**5**
Arizona									1	**1**
California									1	**1**
Colorado				1			3		5	**9**
Georgia										
Idaho										
Montana								2	1	**3**
Nevada										
New Mexico									1	**1**
North Carolina										
Oregon										
South Dakota										
Tennessee										
Utah									1	**1**
Virginia										
Washington									1	**1**
Wyoming										
Other States	1			1					1	**3**
Total 1916	**1**	**1**		**3**			**5**	**2**	**13**	**25**
Total 1915	2	1					1	5	2	**11**
Total 1914		2	2				3	2	2	**11**
Total 1913	2	1		2	1		1	5	6	**18**
Total 1912	3						1	5	3	**12**
Total 1911	3		1				1	3	17	**25**

***States*, *during the year ended Dec. 31, 1916*—Continued.**

COPPER MINES.

Open pit.												Grand total.					
Falls or slides of rock or ore.	Explosives.	Haulage accidents (locomotives, etc.).	Steam shovels.	Falls of persons.	Falls of derricks, booms, etc.	Run or fall of ore in or from ore bins.	Machinery (other than locomotives or steam shovels).	Electricity.	Hand tools.	Other causes.	**Total, open pit.**						
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**		**1916**	**1915**	**1914**	**1913**	**1912**	**1911**
												7	4	2		12	
1	1										**2**	**53**	34	57	74	60	61
												10	5	3	9	9	2
												2		3	3	1	3
												57	61	40	34	44	63
												61	51	33	60	48	50
1		2								1	**4**	**10**	1	6	10	18	12
	4	3									**7**	**12**	**2**	1	16	8	4
3	1	2						1		1	**8**	**15**	14	14	25	27	32
													1		2	1	2
												3	3	6	3	11	9
5	**6**	**7**						**1**		**2**	**21**	**230**					
2		**6**		1							**9**		176				
1	6	**3**									**10**			165			
4	6	**12**					2				**24**				236		
3	13	**4**	2							1	**23**					239	
7	5	**2**		1			2				**17**						238

GOLD, SILVER, AND MISCELLANEOUS METAL MINES.

												22	17	17	25	9	
												15	7	6	12	7	8
							1				**1**	**32**	44	37	42	31	36
												62	47	45	44	46	43
												2	1				
												13	25	22	21	28	20
												14	11	6	4	2	12
												18	17	16	15	16	37
												9	2	2	9	3	4
														3	2	1	2
												1	2	1	3	1	2
												6	6	4	8	6	8
													3	3	3	2	
												9	9	15	9	12	17
												1		1	7	2	
												3	3		2	3	1
		1									**1**	**10**	5	1	4	7	3
		1					**1**				**2**	**217**					
6	5	1		3			2	2		1	**20**		199				
3	3	1		2	1		1	2		1	**14**			179			
1	2	1			1		3	2		2	**12**				210		
5	1	4	2	1			1	1		2	**17**					176	
3				1						1	**5**						193

TABLE 4.—***FATALITIES:*** *By kinds of mines, causes, and*

IRON MINES.

State.	Underground.									
	Fall of rock or ore from roof or wall.	Rock or ore while loading at working face.	Timber or hand tools.	Explosives.	Haulage accidents.	Falling down chute, winze, raise, or stope.	Run of ore from chute or pocket.	Drilling accidents.	Electricity.	Machinery (not including locomotives or drills).
	1	2	3	4	5	6	7	8	9	10
Alabama	7	......	......	3	5	3	......	......	1	......
Michigan	26	1	1	3	4	6	......	......	1	......
Minnesota	10	......	......	5	3	1	1	......	......	......
Missouri	......	......	......	......	......	......	......	......	......	......
New Jersey	2	......	......	2	......	......	......	......	......	......
New York	5	......	......	2	3	1	......	......	1	......
Pennsylvania	1	......	......	......	......	......	......	......	......	......
Tennessee	......	......	......	......	......	......	......	......	......	......
Virginia	......	......	......	......	......	......	......	......	......	......
Wisconsin	......	......	......	......	1	1	2	......	......	......
Other States	2	......	......	......	......	......	......	......	......	......
Total 1916	**53**	**1**	**1**	**15**	**16**	**12**	**3**	......	**3**	......
Total 1915	42	3	1	6	4	8	3	......	1	......
Total 1914	51	3	1	8	13	5	......	......	......	......
Total 1913	52	7	3	11	12	4	2	......	4	......
Total 1912	55	1	1	15	17	9	1	1	2	2
Total 1911	45	......	1	11	6	10	2	......	......	2

LEAD AND ZINC MINES.

Arkansas	......	......	......	......	......	......	......	......	......	......
Illinois	2	......	......	......	......	......	1	......	......	......
Kansas	1	......	......	......	......	......	......	......	......	......
Missouri	11	1	......	8	1	1	......	......	1	1
Oklahoma	1	......	......	2	......	......	......	......	......	......
Wisconsin	11	......	......	......	......	......	......	......	......	......
Other States	1	......	......	......	......	......	......	......	......	......
Total 1916	**27**	**1**	......	**10**	**1**	**1**	**1**	......	**1**	**1**
Total 1915	27	1	......	11	1	1	......	......	......	......
Total 1914	20	1	1	4	......	......	......	......	......	1
Total 1913	16	......	1	7	1	1	......	......	1	......
Total 1912	18	......	......	9	1	1	1	......	3	......
Total 1911	18	......	1	3	2	......	......	......	2	......

NONMETALLIC MINERAL MINES.

All States, 1916	**5**	......	......	**3**	......	......	......	......	**1**	......
All States, 1915	4	......	......	2	1	......	......	......	......	......
All States, 1914	5	......	......	1	2	......	......	......	......	......
All States, 1913	8	......	......	1	......	1	......	......	......	......
All States, 1912	3	......	......	1	1	......	......	......	......	......
All States, 1911	6	......	......	6	......	......	......	......	......	......

States, during the year ended Dec. 31, 1916—Continued.

IRON MINES.

Underground—Continued.						Shaft.						
Mine fires.	Suffocation from natural gases.	Inrush of water.	Stepping on nail.	Other causes.	**Total, underground**	Falling down shafts.	Objects falling down shafts.	Breaking of cables.	Overwinding.	Skip or cage.	Other causes.	**Total, shaft.**
11	12	13	14	15		16	17	18	19	20	21	
......	......	......	......	......	19	......	1	......	......	1	......	2
......	1	1	......	2	46	7	5	......	......	4	......	16
......	......	......	1	1	22	......	1	......	......	1	......	2
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	4	1	......	......	......	......	......	1
......	......	......	......	1	13	......	......	......	......	......	......	......
......	......	......	......	......	1	......	......	......	......	1	......	1
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	4	......	......	......	......	......	......	......
......	......	......	......	......	2	......	......	......	......	......	......	......
......	1	1	1	4	111	8	7	......	......	7	......	22
......	1	......	......	1	70	2	1	1	......	3	1	8
2	......	8	......	2	93	10	4	......	......	7	6	27
......	......	......	......	3	98	6	2	2	1	11	2	24
......	......	5	......	2	111	7	4	......	......	13	1	25
8	1	12	......	5	103	23	3	1	......	......	6	33

LEAD AND ZINC MINES.

......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	3	......	......	......	......	......	......	......
......	......	......	......	......	1	......	......	......	......	......	......	......
......	......	......	1	......	25	2	2	......	......	......	......	4
......	......	......	......	......	3	1	......	......	......	......	......	1
......	......	......	......	......	11	1	......	......	......	......	......	1
......	......	......	......	......	1	......	1	......	......	1	......	2
......	......	......	1	......	44	4	3	......	......	1	......	8
......	......	3	......	......	44	5	2	......	......	2	1	10
2	......	......	......	1	30	3	2	......	......	2	......	7
......	......	......	......	1	28	1	1	......	1	1	......	4
......	......	......	......	2	35	5	4	......	......	......	4	13
......	......	......	......	2	28	1	2	......	......	......	1	4

NONMETALLIC MINERAL MINES.

......	......	......	......	1	10	......	......	......	......	1	......	1
......	......	......	......	......	7	......	1	......	......	......	......	1
......	......	......	......	......	8	......	......	......	......	......	......	......
......	......	......	......	1	11	......	......	......	......	......	......	......
......	......	......	......	......	5	1	......	......	......	......	......	1
......	......	......	......	......	12	......	......	......	......	......	......	......

TABLE 4.—***FATALITIES:*** *By kinds of mines, causes, and*

IRON MINES.

State.	Surface.									
	Mine cars, mine locomotives, or aerial trams. 22	Railway cars and locomotives. 23	Run or fall of ore in or from ore bins. 24	Falls of persons. 25	Stepping on nail. 26	Hand tools, axes, bars, etc. 27	Electricity. 28	Machinery. 29	Other causes. 30	**Total, surface.**
Alabama	1							2	1	**4**
Michigan	3	1		1					1	**6**
Minnesota	1		1	4	1				2	**9**
Missouri										
New Jersey										
New York										
Pennsylvania										
Tennessee										
Virginia				1						**1**
Wisconsin										
Other States										
Total 1916	5	1	1	6	1			2	4	**20**
Total 1915	1	2	1						3	**7**
Total 1914	1	1	2	3			1	1	2	**11**
Total 1913	4		2	3			1	1	4	**15**
Total 1912	2		2	2			1	1	1	**9**
Total 1911	1	2	1					2	4	**10**

LEAD AND ZINC MINES.

State.	22	23	24	25	26	27	28	29	30	**Total, surface.**
Arkansas										
Illinois								1		**1**
Kansas										
Missouri				1					1	**2**
Oklahoma										
Wisconsin				1						**1**
Other States							1			**1**
Total 1916				2			1	1	1	**5**
Total 1915				1					3	**4**
Total 1914								1	1	**2**
Total 1913	2	1					1	2		**6**
Total 1912								1	4	**5**
Total 1911		3							7	**10**

NONMETALLIC MINERAL MINES.

State.	22	23	24	25	26	27	28	29	30	**Total, surface.**
All States, 1916			1			1		2	1	**5**
All States, 1915		1	1							**2**
All States, 1914		2	1				2			**5**
All States, 1913									1	**1**
All States, 1912								1	1	**2**
All States, 1911										

Original from PRINCETON UNIVERSITY

States, during the year ended Dec. 31, 1916—Continued.

IRON MINES.

Open pit.												Grand total.					
Falls or slides of rock or ore.	Explosives.	Haulage accidents (locomotives, etc.).	Steam shovels.	Falls of persons.	Falls of derricks, booms, etc.	Run or fall of ore in or from ore bins.	Machinery (other than locomotives or steam shovels).	Electricity.	Hand tools.	Other causes.	**Total, open pit.**						
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**		**1916**	**1915**	**1914**	**1913**	**1912**	**1911**
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	**25**	12	25	22	32	10
.....	1	2	.....	.....	.....	.....	.....	.....	.....	.....	**3**	**71**	38	58	47	52	69
1	3	3	1	.....	.....	.....	.....	.....	.....	1	**9**	**42**	36	43	63	50	76
.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	**1**	**1**	.....	.....	.....	.....	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	**5**	4	3	5	7	20
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	**13**	7	7	12	14	6
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	**1**	**3**	.....	.....	.....	2	1
.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	**1**	**1**	1	4	1	1	2
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	**1**	1	1	3	2	5
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	**4**	2	2	9	9	2
.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	**1**	**3**	2	5	3	3	5
2	**6**	**5**	**1**	.....	**1**	.....	.....	.....	.....	**1**	**16**	**169**	.....	.....	.....	.....	.....
2	1	11	1	1	1	.....	.....	.....	.....	1	**18**	.....	103	.....	.....	.....	.....
7	2	5	1	1	.....	.....	1	.....	.....	.....	**17**	.....	.....	148	.....	.....	.....
8	3	11	2	1	.....	.....	2	1	.....	.....	**28**	.....	.....	.....	165	.....	.....
5	5	11	.....	1	2	.....	2	.....	.....	1	**27**	.....	.....	.....	.....	172	.....
22	10	14	1	.....	1	.....	.....	.....	.....	3	**51**	.....	.....	.....	.....	.....	197

LEAD AND ZINC MINES.

31	32	33	34	35	36	37	38	39	40	41	Total, open pit.	1916	1915	1914	1913	1912	1911
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	**4**	3	.....	1	1	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	**1**	2	1	4	2	2
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	**31**	44	25	34	36	37
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	**4**	4	3	1	1	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	**13**	6	9	2	13	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	**4**	.....	2	.....	1	2
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	**57**	.....	.....	.....	.....	.....
.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1	**2**	.....	60	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	**1**	.....	.....	40	.....	.....	.....
1	1	.....	.....	.....	.....	.....	1	.....	.....	1	**4**	.....	.....	.....	42	.....	.....
.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	**1**	.....	.....	.....	.....	54	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	**1**	.....	.....	.....	.....	.....	43

NONMETALLIC MINERAL MINES.

31	32	33	34	35	36	37	38	39	40	41	Total, open pit.	1916	1915	1914	1913	1912	1911
1	**3**	.....	.....	**2**	.....	.....	.....	**1**	.....	**1**	**8**	**24**	.....	.....	.....	.....	.....
2	.....	.....	.....	1	.....	.....	.....	1	.....	1	**5**	.....	15	.....	.....	.....	.....
7	.....	.....	.....	1	.....	.....	3	1	.....	2	**14**	.....	.....	27	.....	.....	.....
3	.....	6	.....	.....	.....	.....	2	2	.....	5	**18**	.....	.....	.....	30	.....	.....
3	2	1	.....	1	.....	.....	2	.....	.....	3	**12**	.....	.....	.....	.....	20	.....
3	1	5	.....	1	.....	.....	.....	1	.....	1	**12**	.....	.....	.....	.....	.....	24

TABLE 5.—*ALL MINES, 1916: Men employed, number killed, and number killed per 1,000 employed, and days worked, by States, during the year ended Dec. 31, 1916.*

State.	Number of active operators reporting.	Number of employees.			Days' work done.	Average number of days worked.	Number killed.						Widows.	Orphans.
		Under-ground.	On the surface.	**Total.**			Under-ground.[a]	Per 1,000 em-ployed.	On the surface.	Per 1,000 em-ployed.	**Total.**	Per 1,000 em-ployed.		
Alabama	22	4,614	2,746	**7,360**	2,162,392	294	23	4.98	4	1.46	**27**	3.67	14	31
Alaska	428	5,258	2,935	**8,193**	1,745,476	213	24	4.56	5	1.70	**29**	3.54	6	24
Arizona	445	15,534	5,887	**21,421**	6,499,137	303	62	3.99	6	1.02	**68**	3.17	23	49
Arkansas	23	257	755	**1,012**	236,074	233	....	....	1	1.32	**1**	.99	....	....
California[b]	840	7,879	5,416	**13,295**	3,768,322	283	36	4.57	6	1.11	**42**	3.16	9	13
Colorado	738	9,008	1,112	**10,120**	3,236,196	320	53	5.88	10	8.99	**63**	6.23	19	....
Connecticut	3	46	64	**110**	28,229	257	....	....	....	....	....	....	....	....
Florida	14	....	1,974	**1,974**	498,605	253	....	....	4	2.03	**4**	2.03	2	2
Georgia	26	174	430	**604**	118,198	196	2	11.49	2	4.65	**4**	6.62	4	7
Idaho	510	4,469	1,614	**6,083**	1,585,121	261	15	3.36	....	....	**15**	2.47	4	7
Illinois	7	309	200	**509**	125,479	247	3	9.71	1	5.00	**4**	7.86	3	1
Iowa	9	250	21	**271**	69,959	258	1	4.00	....	....	**1**	3.69	....	....
Kansas	29	394	221	**615**	157,194	256	3	7.61	....	....	**3**	4.88	1	5
Kentucky	8	86	192	**278**	36,630	132	....	....	....	....	....	....	....	....
Maine	4	....	60	**60**	16,948	282	....	....	....	....	....	....	....	....
Maryland	10	24	119	**143**	20,909	146	....	....	....	....	....	....	....	....
Massachusetts	3	23	11	**34**	8,410	247	....	....	....	....	....	....	....	....
Michigan	76	23,712	10,349	**34,061**	10,209,502	300	113	4.77	15	1.45	**128**	3.76	70	167
Minnesota	63	8,666	10,486	**19,152**	4,870,007	254	24	2.77	18	1.72	**42**	2.19	25	67
Missouri	159	10,596	3,738	**14,334**	3,920,002	273	32	3.02	3	.80	**35**	2.44	20	38
Montana	328	15,086	4,405	**19,491**	5,793,114	297	69	4.57	6	1.36	**75**	3.85	26	45
Nevada	406	5,222	2,731	**7,953**	2,181,188	274	25	4.79	5	1.83	**30**	3.77	6	8
New Hampshire	3	5	29	**34**	9,288	273	....	....	....	....	....	....	....	....
New Jersey	7	1,529	502	**2,031**	623,793	307	6	3.92	2	3.98	**8**	3.94	5	7
New Mexico	123	2,377	1,805	**4,182**	1,181,330	282	10	4.21	11	6.09	**21**	5.02	11	27
New York	37	2,200	1,462	**3,662**	1,048,875	286	14	6.36	2	1.37	**16**	4.37	7	20
North Carolina	23	396	299	**695**	167,282	241	....	....	....	....	....	....	....	....
Ohio	5	240	22	**262**	69,570	266	1	4.17	....	....	**1**	3.82	....	....
Oklahoma	37	1,107	486	**1,593**	348,759	219	5	4.52	....	....	**5**	3.14	3	6
Oregon	210	704	604	**1,308**	268,056	205	1	1.42	....	....	**1**	.76	1	....
Pennsylvania	21	89	371	**460**	116,162	253	3	33.71	1	2.70	**4**	8.70	1	4
South Carolina	3	2	151	**153**	41,975	274	....	....	....	....	....	....	....	....
South Dakota	65	1,650	841	**2,491**	784,715	315	6	3.64	....	....	**6**	2.41	3	4
Tennessee	25	1,671	2,165	**3,836**	991,838	259	7	4.19	4	1.85	**11**	2.87	4	6
Texas	11	373	570	**943**	331,399	351	1	2.68	1	1.75	**2**	2.12	....	....
Utah	223	4,690	2,694	**7,384**	2,345,007	318	14	2.99	10	3.71	**24**	3.25	8	17
Vermont	7	116	39	**155**	42,557	275	2	17.24	....	....	**2**	12.90	....	....

Virginia	27	1,044	1,875	**2,919**	753,543	258	1	.96	2	1.07	**3**	1.03	2	2
Washington	176	772	467	**1,239**	208,164	168	2	2.59	1	2.14	**3**	2.42	....	....
Wisconsin	51	2,417	1,157	**3,574**	937,859	262	16	6.62	1	.86	**17**	4.76	7	15
Wyoming	49	174	327	**501**	116,261	232	....	....	1	3.06	**1**	2.00	....	....
Other States	4	....	190	**190**	62,900	331	....	....	1	5.26	**1**	5.26	1	2
Total 1916	**5,258**	**133,163**	**71,522**	**204,685**	**57,736,425**	**282**	**574**	**4.31**	**123**	**1.72**	**697**	**3.41**	**285**	**574**
Total 1915	4,322	96,223	55,895	**152,118**	42,599,015	280	451	4.69	102	1.82	**553**	3.64	275	484
Total 1914	4,805	101,618	56,497	**158,115**	42,785,840	271	466	4.59	93	1.65	**559**	3.54	252	442
Total 1913	6,387	126,369	64,907	**191,276**	55,077,855	288	548	4.34	135	2.08	**683**	3.57	286	501
Total 1912	5,967	110,056	59,143	**169,199**	48,498,510	287	522	4.74	139	2.35	**661**	3.91	273	520
Total 1911	5,232	104,623	61,356	**165,979**	46,826,573	282	542	5.18	153	2.49	**695**	4.19	297	600

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[a] Includes shaft accidents.

[b] See special paragraph, p. 84.

TABLE 6.—**COPPER MINES:** *Men employed, number killed, and number killed per 1,000 employed, and days worked, by States, during the year ended Dec. 31, 1916.*

State.	Number of active operators reporting.	Number of employees.			Days' work done.	Average number of days worked.	Number killed.						Widows.	Orphans.
		Under-ground.	On the surface.	**Total.**			Under-ground.[a]	Per 1,000 employed.	On the surface.	Per 1,000 employed.	**Total.**	Per 1,000 employed.		
Alaska	17	410	316	**726**	252,076	347	7	17.07	....	....	**7**	9.64	1	5
Arizona	164	12,915	4,482	**17,397**	5 560,234	320	48	3.72	5	1.12	**53**	3.05	16	32
California	48	1,417	653	**2,070**	666,328	322	6	4.23	4	6.13	**10**	4.83	2	....
Idaho	62	623	175	**798**	212,694	267	2	3.21	....	....	**2**	2.51	....	....
Michigan	23	10,713	4,613	**15,326**	4,619,126	301	51	4.76	6	1.30	**57**	3.72	31	58
Montana	56	12,356	3,077	**15,433**	4,672,737	303	58	4.69	3	.97	**61**	3.95	18	30
Nevada	46	768	987	**1,755**	549,262	313	5	6.51	5	5.07	**10**	5.70	3	....
New Mexico	36	1,131	1,251	**2,382**	717,788	301	2	1.77	10	7.99	**12**	5.04	8	20
Oregon	24	161	68	**229**	53,995	236	....	....	....	....	....	....	....	....
Utah	52	1,876	2,021	**3,897**	1,320,822	339	6	3.20	9	4.45	**15**	3.85	3	6
Washington	50	232	137	**369**	77,727	211	....	....	....	....	....	....	....	....
Other States	26	613	233	**846**	229,353	267	3	4.89	....	....	**3**	3.55	2	6
Total 1916	**604**	**43,215**	**18,013**	**61,228**	**18,932,142**	**309**	**188**	**4.35**	**42**	**2.33**	**230**	**3.76**	**84**	**157**
Total 1915	548	32,421	14,753	**47,174**	14,211,400	301	143	4.41	33	2.24	**176**	3.73	99	186
Total 1914	585	31,265	13,421	**44,686**	12,845,058	287	147	4.70	18	1.34	**165**	3.69	69	106
Total 1913	694	39,917	16,222	**56,139**	17,369,266	327	203	5.09	33	2.03	**236**	4.20	100	180
Total 1912	814	37,539	14,237	**51,776**	15,831,250	306	185	4.93	54	3.79	**239**	4.62	87	159
Total 1911	396	31,557	13,136	**44,693**	13,774,325	308	199	6.31	39	2.97	**238**	5.33	91	195

[a] Includes shaft accidents.

TABLE 7.—***GOLD, SILVER, AND MISCELLANEOUS METAL MINES:*** *Men employed, number killed, and number killed per 1,000 employed, and days worked, during the year ended Dec. 31, 1916.*

State.	Number of active operators reporting.	Number of employees.			Days' work done.	Average number of days worked.	Number killed.						Widows.	Orphans.
		Under-ground.	On the surface.	**Total.**			Under-ground.[a]	Per 1,000 employed.	On the surface.	Per 1,000 employed.	**Total.**	Per 1,000 employed.		
Alaska	411	4,848	2,619	**7,467**	1,493,400	200	17	3.51	5	1.91	**22**	2.95	5	19
Arizona	275	2,580	1,342	**3,922**	915,983	234	14	5.43	1	.75	**15**	3.82	7	17
California	768	6,064	4,176	**10,240**	2,836,293	277	30	4.95	2	.48	**32**	3.13	7	13
Colorado	715	8,996	993	**9,989**	3,196,896	320	53	5.89	10	10.07	**63**	6.31	19	....
Georgia	13	100	106	**206**	32,858	160	2	20.00	....	....	**2**	9.71	2	7
Idaho	446	3,844	1,436	**5,280**	1,372,312	260	13	3.38	....	....	**13**	2.46	4	7
Montana	269	2,706	1,324	**4,030**	1,116,122	277	11	4.07	3	2.27	**14**	34.74	8	15
Nevada	354	4,388	1,665	**6,053**	1,590,448	263	18	4.10	....	....	**18**	2.97	3	8
New Mexico	82	1,193	365	**1,558**	408,798	262	8	6.71	1	2.74	**9**	5.78	3	7
New York	3	179	49	**228**	69,183	303	....	....	....	....	....	....	....	....
North Carolina	7	57	29	**86**	6,755	79	....	....	....	....	....	....	....	....
Oregon	185	542	536	**1,078**	213,971	198	1	1.85	....	....	**1**	.93	1	....
South Dakota	60	1,611	823	**2,434**	778,315	320	6	3.72	....	....	**6**	2.47	3	4
Texas	4	357	85	**442**	158,707	359	1	2.80	1	11.76	**2**	4.52	....	....
Utah	162	2,740	632	**3,372**	996,588	296	8	2.92	1	1.58	**9**	2.67	5	11
Virginia	9	281	525	**806**	202,627	251	1	3.56	....	....	**1**	1.24	1	2
Washington	122	534	314	**848**	129,047	152	2	3.75	1	3.18	**3**	3.54	....	....
Wyoming	26	44	43	**87**	7,708	89	....	....	....	....	....	....	....	....
Other States	10	1,094	887	**1,981**	565,731	286	5	4.57	2	2.25	**7**	3.54	3	6
Total 1916	**3,921**	**42,158**	**17,949**	**60,107**	**16,091,742**	**268**	**190**	**4.51**	**27**	**1.50**	**217**	**3.61**	**71**	**116**
Total 1915	3,120	29,163	16,149	**45,312**	12,472,682	275	168	5.76	31	1.92	**199**	4.39	77	133
Total 1914	3,536	35,432	13,006	**48,438**	13,241,280	273	154	4.35	25	1.92	**179**	3.70	60	87
Total 1913	4,749	44,810	14,691	**59,501**	16,433,608	276	180	4.02	30	2.04	**210**	3.53	67	70
Total 1912	4,137	31,322	12,822	**44,144**	12,229,761	277	147	4.69	29	2.26	**176**	3.99	71	98
Total 1911	3,817	35,176	13,743	**48,919**	13,512,633	276	163	4.63	30	2.18	**193**	3.95	61	118

[a] Includes shaft accidents.

TABLE 8.—***IRON MINES:*** *Men employed, number killed, and number killed per 1,000 employed, and days worked, by States, during the year ended Dec. 31, 1916.*

State.	Number of active operators reporting.	Number of employees.			Days' work done.	Average number of days worked.	Number killed.						Widows.	Orphans.
		Under-ground.	On the surface.	**Total.**			Under-ground.[a]	Per 1,000 em-ployed.	On the surface.	Per 1,000 em-ployed.	**Total.**	Per 1,000 em-ployed.		
Alabama	17	4,614	2,647	**7,261**	2,143,058	295	21	4.55	4	1.51	**25**	3.44	14	31
Georgia	3	....	167	**167**	19,475	117	....	....	....	....	....	....	....	....
Michigan	47	12,814	5,625	**18,439**	5,506,006	299	62	4.84	9	1.60	**71**	3.85	39	109
Minnesota	61	8,571	10,446	**19,017**	4,833,107	254	24	2.80	18	1.72	**42**	2.21	25	67
Missouri	4	56	86	**142**	42,930	302	....	....	1	11.63	**1**	7.04	....	....
New Jersey	5	581	277	**858**	262,541	306	5	8.61	....	....	**5**	5.83	3	4
New Mexico	3	53	172	**225**	50,894	226	....	....	....	....	....	....	....	....
New York	11	1,516	812	**2,328**	679,802	292	13	8.58	....	....	**13**	5.58	4	11
Pennsylvania	7	46	302	**348**	86,543	249	2	43.48	1	3.31	**3**	8.62	....	....
Tennessee	10	442	642	**1,084**	242,251	223	....	....	1	1.56	**1**	.92	1	....
Virginia	9	618	1,113	**1,731**	442,200	255	....	....	1	.90	**1**	.58	1	....
Wisconsin	5	797	339	**1,136**	339,059	298	4	5.02	....	....	**4**	3.52	1	....
Other States	17	377	375	**752**	221,261	294	2	5.31	1	2.67	**3**	3.99	....	....
Total 1916	**199**	**30,485**	**23,003**	**53,488**	**14,869,127**	**278**	**133**	**4.36**	**36**	**1.57**	**169**	**3.16**	**88**	**222**
Total 1915	191	23,302	16,089	**39,391**	10,710,798	272	78	3.35	25	1.55	**103**	2.16	67	127
Total 1914	196	24,847	19,960	**44,807**	11,745,978	262	120	4.83	28	1.40	**148**	3.30	86	178
Total 1913	206	29,384	21,749	**51,133**	15,064,429	295	122	4.15	43	1.98	**165**	3.23	81	178
Total 1912	194	26,799	18,947	**45,746**	13,035,485	285	136	5.07	36	1.90	**172**	3.76	84	198
Total 1911	207	25,461	20,492	**45,953**	12,749,121	277	136	5.34	61	2.98	**197**	4.29	114	237

[a] Includes shaft accidents.

TABLE 9.—***LEAD AND ZINC MINES*** (*Mississippi Valley*): *Men employed, number killed, and number killed per 1,000 employed, and days worked, by States, during the year ended Dec. 31, 1916*

State.	Number of active operators reporting.	Number of employees.			Days' work done.	Average number of days worked.	Number killed.						Widows.	Orphans.
		Under-ground.	On the surface.	**Total.**			Under-ground.[a]	Per 1,000 em-ployed.	On the surface.	Per 1,000 em-ployed.	**Total.**	Per 1,000 em-ployed.		
Arkansas	**21**	257	175	**432**	82,474	191	....	....	....	....	....	....	....	....
Illinois	**7**	309	200	**509**	125,479	247	3	9.71	**1**	5.00	**4**	7.86	3	1
Kansas	**25**	310	174	**484**	119,436	247	1	3.23	....	....	**1**	2.07	1	5
Missouri	141	**10**,451	**3**,528	**13,979**	**3**,824,936	274	29	2.77	**2**	.57	**31**	2.22	19	35
Oklahoma	**33**	**1**,072	433	**1,505**	328,281	218	4	3.73	....	....	**4**	2.66	2	5
Tennessee	**4**	635	537	**1,172**	341,553	291	3	4.72	1	1.86	**4**	3.41	....	....
Wisconsin	**45**	**1**,620	814	**2,434**	597,688	246	**12**	**7.41**	**1**	1.23	**13**	5.34	6	15
Other States	**9**	33	67	**100**	22,731	227	....	....	....	....	....	....	....	....
Total 1916	**285**	**14,687**	**5,928**	**20,615**	**5,442,578**	**264**	**52**	**3.54**	**5**	**.84**	**57**	**2.76**	**31**	**61**
Total 1915	241	9,493	3,484	**12,977**	3,350,386	258	54	5.69	6	**1.**72	**60**	4.62	23	28
Total 1914	248	7,609	3,326	**10,935**	2,779,109	254	37	4.86	3	.90	**40**	3.66	23	53
Total 1913	409	9,261	3,436	**12,697**	3,226,669	254	32	3.46	10	**2.**91	**42**	3.31	25	46
Total 1912	464	10,812	3,520	**14,332**	3,782,944	265	48	4.44	6	**1.**70	**54**	3.77	26	62
Total 1911	483	9,247	3,274	**12,521**	3,202,339	256	32	3.46	11	**3.**36	**43**	3.43	26	40

[a] Includes shaft accidents.

TABLE 10.—*NONMETALLIC MINERAL MINES: Men employed, number killed, and number killed per 1,000 employed, and days worked, by States, during the year ended Dec. 31, 1916.*

State.	Number of active operators reporting.	Number of employees.			Days' work done.	Average number of days worked.	Number killed.						Widows.	Orphans.
		Under-ground.	On the surface.	**Total.**			Under-ground.[a]	Per 1,000 em-ployed.	On the surface.	Per 1,000 em-ployed.	**Total.**	Per 1,000 em-ployed.		
California	23	394	565	**959**	258,501	269	....	....	....	....	....	....	....	....
Florida	14	....	1,974	**1,974**	498,605	253	....	....	4	2.03	**4**	2.03	2	2
Georgia	10	74	157	**231**	65,865	285	....	....	2	12.74	**2**	8.66	2	....
Iowa	5	243	16	**259**	68,098	263	1	4.12	....	....	**1**	3.86	....	....
Maine	4	....	60	**60**	16,948	282	....	....	....	....	....	....	....	....
Michigan	6	185	111	**296**	84,370	285	....	....	....	....	....	....	....	....
New York	23	505	601	**1,106**	299,890	271	1	1.98	2	3.33	**3**	2.71	3	9
North Carolina	14	175	234	**409**	99,898	244	....	....	....	....	....	....	....	....
Ohio	5	240	22	**262**	69,570	266	1	4.17	....	....	**1**	3.82	....	....
Pennsylvania	14	43	69	**112**	29,619	264	1	23.26	....	....	**1**	8.93	1	4
Tennessee	9	125	851	**976**	226,024	232	1	8.00	2	2.35	**3**	3.07	1	....
Utah	9	74	41	**115**	27,597	240	....	....	....	....	....	....	....	....
Vermont	5	66	21	**87**	26,817	308	2	30.30	....	....	**2**	22.99	....	....
Virginia	7	135	218	**353**	103,366	293	....	....	1	4.59	**1**	2.83	....	....
Other States	101	359	1,689	**2,048**	525,668	257	4	11.14	2	1.19	**6**	2.93	2	3
Total 1916	**249**	**2,618**	**6,629**	**9,247**	**2,400,836**	**260**	**11**	**4.20**	**13**	**1.96**	**24**	**2.60**	**11**	**18**
Total 1915	222	1,844	5,420	**7,264**	1,853,749	255	8	4.34	7	1.29	**15**	2.06	9	10
Total 1914	240	2,465	6,784	**9,249**	2,177,306	235	8	3.25	19	2.80	**27**	2.92	14	18
Total 1913	329	2,997	8,809	**11,806**	2,983,883	253	11	3.67	19	2.16	**30**	2.54	13	27
Total 1912	358	3,584	9,617	**13,201**	3,619,070	274	6	1.67	14	1.46	**20**	1.52	5	3
Total 1911	329	3,182	10,711	**13,893**	3,588,155	258	12	3.77	12	1.12	**24**	1.73	5	10

[a] Includes shaft accidents.

TABLE 11.—*ALL MINES: Injuries, by causes*

State.	Underground.									
	Fall of rock or ore from roof or wall.	Rock or ore while loading at working face.	Timber or hand tools.	Explosives.	Haulage accidents.	Falling down chute, winze, raise, or stope.	Run of ore from chute or pocket.	Drilling accidents.	Electricity.	Machinery (not including locomotives or drills).
	1	2	3	4	5	6	7	8	9	10
Alabama	224	332	159	18	582	17	87	118	1	26
Alaska	84	66	36	13	57	22	17	45	3	6
Arizona	1,739	647	722	175	790	161	415	252	19	25
Arkansas	21	1	4	3	2	....	28	2	....	1
California *a*	667	352	219	53	185	108	28	280	3	30
Colorado	253	107	105	39	218	76	15	97	7	....
Connecticut	2	....	....	....	....	....	....	....	....	....
Florida	....	....	....	....	....	....	....	....	....	....
Georgia	12	1	7	2	2	1	....	2	....	....
Idaho	191	117	138	7	87	32	5	79	5	7
Illinois	33	25	2	2	24	2	....	6	....	....
Iowa	6	22	2	1	3	....	....	3	....	....
Kansas	33	8	20	1	2	6	....	1	....	....
Kentucky	....	1	....	....	8	....	....	....	....	....
Maine	....	....	....	....	....	....	....	....	....	....
Maryland	....	....	....	....	....	11	....	....	....	....
Massachusetts	....	....	....	....	....	....	....	....	....	....
Michigan	2,018	1,703	845	89	1,140	145	250	504	27	47
Minnesota	691	114	522	50	364	34	25	77	7	6
Missouri	340	773	52	23	356	25	11	227	1	29
Montana	1,828	431	931	26	547	168	31	89	1	74
Nevada	311	121	110	23	140	55	5	72	2	10
New Hampshire	....	....	....	....	....	....	....	....	....	....
New Jersey	52	55	36	10	34	20	19	40	1	1
New Mexico	119	29	10	11	61	6	5	16	5	10
New York	50	417	19	206	121	15	9	82	2	8
North Carolina	2	....	22	....	20	....	....	1	....	1
Ohio	5	6	....	3	5	....	....	3	....	....
Oklahoma	33	40	11	9	24	5	....	19	....	2
Oregon	19	3	6	2	3	11	2	3	....	1
Pennsylvania	....	....	1	....	2	....	....	....	....	1
South Carolina	....	....	....	....	....	....	....	....	....	....
South Dakota	72	203	40	6	83	13	50	60	1	2
Tennessee	78	139	32	6	66	31	1	21	....	2
Texas	5	30	1	1	7	3	....	3	....	....
Utah	381	89	76	11	155	59	8	80	1	3
Vermont	4	5	....	1	....	....	....	1	....	....
Virginia	59	13	20	3	16	7	....	8	....	1
Washington	7	1	11	2	2	....	....	1	....	4
Wisconsin	194	100	35	14	109	27	7	61	3	35
Wyoming	2	....	1	....	1	....	....	....	....	....
Other States	....	....	....	....	....	....	....	....	....	....
Total 1916	**9,535**	**5,951**	**4,195**	**810**	**5,226**	**1,060**	**1,018**	**2,253**	**89**	**332**
Total 1915	6,623	4,476	3,210	342	3,732	847	682	2,157	69	449
Total 1914	6,104	3,553	2,730	334	3,303	823	649	1,488	52	204
Total 1913	6,714	2,584	3,795	376	3,834	947	1,118	1,500	59	487
Total 1912	6,984	3,134	2,856	399	3,311	941	1,041	1,613	39	471
Total 1911	7,256	....	2,063	381	3,530	908	981	1,397	33	682

a See special paragraph, p. 84.

and States, during the year ended Dec. 31, 1916.

Underground—Continued.						Shaft.						
Mine fires.	Suffocation from natural gases.	Inrush of water.	Stepping on nail.	Other causes.	**Total, underground.**	Falling down shafts.	Objects falling down shafts.	Breaking of cables.	Overwinding.	Skip or cage.	Other causes.	**Total, shaft.**
11	**12**	**13**	**14**	**15**		**16**	**17**	**18**	**19**	**20**	**21**	
......	......	......	16	153	**1,733**	......	2	......	......	18	7	**27**
......	3	......	11	92	**455**	......	1	......	......	3	3	**7**
......	12	......	121	1,284	**6,362**	10	7	......	1	24	27	69
......	......	......	12	4	**78**	......	......	......	......	......	......	......
1	3	......	100	553	**2,582**	27	33	1	1	36	47	**145**
......	3	......	34	196	**1,150**	15	27	......	1	20	12	**75**
......	......	......	......	......	**2**	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	1	**28**	1	......	......	1	1	......	**3**
......	1	......	38	113	**820**	2	6	......	......	4	1	**13**
......	......	......	......	13	**107**	......	......	......	......	1	......	**1**
......	......	......	......	13	**50**	......	......	......	......	......	1	**1**
......	......	......	2	4	**77**	1	14	......	......	......	......	**15**
......	......	......	......	......	**9**	......	1	......	......	1	......	**2**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	**11**	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	4	1	71	997	**7,841**	31	76	......	1	77	79	**264**
......	2	2	46	330	**2,270**	7	19	......	1	30	24	**81**
14	2	......	59	471	**2,396**	4	62	......	1	44	51	**162**
2	4	......	66	550	**4,748**	6	31	1	......	15	40	**93**
2	1	1	37	217	**1,107**	4	6	......	......	10	30	**50**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	2	41	**311**	8	5	......	......	4	9	**26**
......	1	......	6	24	**303**	5	9	......	......	6	4	**24**
......	......	......	11	216	**1,156**	1	2	......	......	6	25	**34**
......	......	......	35	2	**83**	......	......	......	......	......	......	......
......	......	......	1	10	**33**	1	......	......	......	......	......	**1**
......	......	......	7	51	**201**	......	18	......	......	20	5	**43**
......	......	......	3	16	**69**	......	......	......	......	......	......	......
......	......	......	......	1	**5**	......	......	......	......	......	1	**1**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	1	119	**650**	3	3	1	......	3	9	**19**
......	......	......	11	33	**420**	......	......	......	......	......	1	**1**
......	......	......	......	1	**51**	......	......	......	......	......	......	......
......	1	......	29	188	**1,081**	1	15	1	......	14	5	**36**
......	......	......	......	6	**17**	......	2	......	......	2	......	**4**
2	......	......	4	39	**172**	......	......	......	......	2	1	**3**
......	......	......	......	2	**30**	......	......	......	......	1	1	**2**
......	1	......	27	177	**790**	5	8	1	......	18	11	**43**
......	......	......	......	2	**6**	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
21	**38**	**4**	**750**	**5,922**	**37,204**	**132**	**347**	**5**	**7**	**360**	**394**	**1,245**
42	82	34	686	4,462	**27,893**	61	271	5	2	259	238	**836**
6	22	12	234	3,783	**23,297**	50	182	9	3	260	196	**700**
12	21	17	318	3,010	**24,792**	100	249	9	8	219	148	**733**
12	35	10	241	2,992	**24,079**	104	278	6	5	245	143	**781**
24	18	14	......	3,465	**20,752**	93	256	7	26	......	244	**626**

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TABLE 11.—*ALL MINES: Injuries, by causes and*

State.	Surface (shops and yards).									
	Mine cars, mine locomotives, or aerial trams.	Railway cars and locomotives.	Run or fall of ore in or from ore bins.	Falls of persons.	Stepping on nail.	Hand tools, axes, bars, etc.	Electricity.	Machinery.	Other causes.	**Total, surface.**
	22	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	
Alabama	31	3	3	4	2	8	......	14	52	**117**
Alaska	7	18	2	17	10	23	4	16	88	**185**
Arizona	95	12	5	88	35	94	9	51	494	**883**
Arkansas	9	......	2	3	1	11	......	1	2	**29**
California	28	9	11	56	42	74	13	31	203	**467**
Colorado	30	1	3	29	13	28	3	33	60	**200**
Connecticut	......	......	......	......	......	......	......	......	......	......
Florida	......	4	2	7	10	19	1	7	23	**73**
Georgia	2	......	......	1	......	1	......	1	......	**5**
Idaho	8	......	......	9	3	8	1	10	39	**78**
Illinois	10	5	......	17	3	4	1	5	36	**81**
Iowa	......	......	......	......	1	......	1	......	......	**2**
Kansas	1	......	......	......	5	1	......	......	5	**12**
Kentucky	1	......	......	3	1	1	......	1	1	**8**
Maine	......	......	......	......	......	......	......	......	......	......
Maryland	......	......	......	......	......	......	......	......	......	......
Massachusetts	......	......	......	1	......	......	......	......	2	**3**
Michigan	38	32	29	151	48	149	6	123	483	**1,059**
Minnesota	35	19	5	66	47	93	1	52	275	**593**
Missouri	8	13	25	43	37	50	5	41	210	**432**
Montana	29	3	7	28	25	46	1	43	312	**494**
Nevada	20	4	3	14	13	8	2	13	56	**133**
New Hampshire	......	......	......	......	......	......	......	......	......	......
New Jersey	3	2	......	8	2	7	......	2	46	**70**
New Mexico	10	3	1	10	5	16	4	6	51	**106**
New York	5	12	2	1	3	4	1	13	42	**83**
North Carolina	9	3	......	2	3	5	......	2	......	**24**
Ohio	......	......	......	......	......	......	......	......	......	......
Oklahoma	......	......	1	12	11	1	......	4	21	**50**
Oregon	......	......	......	2	1	1	......	1	5	**10**
Pennsylvania	2	......	......	......	1	......	......	......	2	**5**
South Carolina	......	......	......	1	......	......	......	......	......	**1**
South Dakota	11	1	3	2	1	5	1	11	35	**70**
Tennessee	21	14	7	12	13	31	2	29	75	**204**
Texas	2	......	......	3	50	75	......	27	49	**206**
Utah	20	2	7	12	4	6	......	15	61	**127**
Vermont	1	......	......	......	......	1	......	......	7	**9**
Virginia	11	8	2	2	4	9	......	4	28	**68**
Washington	2	1	......	8	......	3	......	1	1	**16**
Wisconsin	9	6	3	32	36	33	2	43	101	**265**
Wyoming	......	1	......	3	2	......	......	......	2	**8**
Other States	18	......	2	11	16	8	......	2	27	**84**
Total 1916	**476**	**176**	**125**	**658**	**448**	**823**	**58**	**602**	**2,894**	**6,260**
Total 1915	218	87	102	412	266	576	49	394	1,769	**3,873**
Total 1914	257	93	95	387	145	526	26	333	1,254	**3,116**
Total 1913	166	129	54	376	127	680	22	418	978	**2,950**
Total 1912	170	79	120	393	123	562	29	473	726	**2,675**
Total 1911	185	57	116	......	......	......	23	381	1,230	**1,992**

States, during the year ended Dec. 31, 1916—Continued.

Open pit.												
Falls or slides of rock or ore.	**Explosives.**	**Haulage accidents (locomotives, etc.).**	**Steam shovels.**	**Falls of persons.**	**Falls of derricks, booms, etc.**	**Run or fall of ore in or from ore bins.**	**Machinery (other than locomotives or steam shovels).**	**Electricity.**	**Hand tools.**	**Other causes.**	**Total, open pit.**	**Grand Total.**
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**		**1916**
1	5	21	6	14	......	8	9	......	23	49	**136**	**2,013**
2	......	......	......	......	......	......	3	......	1	4	**10**	**657**
9	......	3	......	1	......	......	......	......	5	8	**26**	**7,340**
12	1	7	......	......	......	......	......	......	2	1	**23**	**130**
19	2	10	......	76	......	......	127	2	105	216	**557**	**3,751**
5	......	6	......	7	......	2	5	......	2	5	**32**	**1,457**
......	......	......	......	......	......	......	......	......	......	......	......	**2**
3	1	......	......	9	......	......	7	2	23	46	**91**	**164**
......	......	3	......	1	......	......	2	......	......	2	**8**	**44**
1	......	......	......	......	......	......	2	......	......	1	**4**	**915**
......	......	......	......	......	......	......	......	......	......	......	......	**189**
......	......	......	......	......	......	......	......	......	......	......	......	**53**
......	......	......	......	1	......	......	......	......	......	......	**1**	**105**
9	......	5	......	1	......	2	......	......	2	......	**19**	**38**
......	......	......	......	......	......	......	......	......	4	......	**4**	**4**
......	......	......	......	......	......	......	......	......	......	......	......	**11**
......	......	......	......	......	......	......	......	......	......	......	......	**3**
9	2	36	15	8	......	......	1	......	20	55	**146**	**9,310**
94	26	133	120	64	1	......	13	4	73	220	**748**	**3,692**
4	......	1	2	2	2	......	......	......	......	4	**15**	**3,005**
1	2	......	......	1	......	......	2	......	1	2	**9**	**5,344**
18	......	19	3	21	1	......	7	1	5	86	**161**	**1,451**
......	......	......	......	......	......	......	......	......	......	......	......	......
4	2	......	......	3	......	......	......	......	......	5	**14**	**421**
31	3	42	16	14	1	1	11	2	30	133	**284**	**717**
9	4	1	......	1	......	1	1	......	1	20	**38**	**1,311**
1	......	......	2	1	......	1	2	......	......	1	**8**	**115**
......	......	......	......	......	......	......	......	......	......	......	......	**34**
......	......	2	......	......	......	3	......	1	......	1	**7**	**301**
3	......	......	......	1	......	......	......	......	......	1	**5**	**84**
10	1	4	2	4	......	......	2	......	3	5	**31**	**42**
......	......	......	......	......	......	......	......	......	......	......	......	**1**
......	......	......	......	......	......	......	......	......	......	......	......	**739**
13	2	26	1	1	......	1	1	......	7	19	**71**	**696**
......	2	2	......	......	......	......	1	......	......	......	**5**	**262**
262	5	49	17	10	......	1	9	......	38	627	**1,018**	**2,262**
......	......	......	......	......	......	......	......	......	......	......	......	**30**
6	2	6	1	3	......	......	3	......	1	8	**30**	**273**
......	......	......	......	......	......	......	......	......	......	......	......	**48**
......	......	......	1	1	......	......	......	......	......	......	**2**	**1,100**
15	......	1	......	2	......	......	......	......	1	6	**25**	**39**
......	......	......	......	......	......	......	......	......	......	......	......	**84**
541	**60**	**377**	**186**	**247**	**5**	**20**	208	**12**	**347**	**1,525**	**3,528**	**48,237**
536	46	229	95	255	10	15	167	10	276	1,054	**2,693**	**35,295**
541	130	329	153	298	14	8	208	8	390	1,024	**3,103**	**30,216**
842	203	479	352	419	42	28	189	14	548	1,380	**4,496**	**32,971**
557	174	378	308	331	48	9	172	13	375	834	**3,199**	**30,734**
520	150	500	244	347	79	13	347	12	......	995	**3,207**	**26,577**

TABLE 12.—***ALL MINES:*** *Men employed, number injured, and number injured per 1,000 employed, by States, during the year 1916.*

State.	Employees.[a]	Number injured.						Character of accidents that must be reported according to State law.
		Underground.	Per 1,000 employed.	On the surface.	Per 1,000 employed.	**Total.**	Per 1,000 employed.	
Alabama	7,360	1,760	381.45	253	92.13	**2,013**	273.51	
Alaska	8,193	462	87.87	195	66.44	**657**	80.19	Fatal or serious, at mines employing 6 or more men. Acts Apr. 30, 1913; Apr. 25, 1915.
Arizona	21,421	6,431	414.00	909	154.41	**7,340**	342.65	Fatal or serious. Acts of 1912, chap. 33.
Arkansas	1,012	78	303.50	52	68.87	**130**	128.46	
California [b]	13,295	2,727	346.11	1,024	189.07	**3,751**	282.14	Any accident. Acts Apr. 8, 1911; May 26 and Aug. 10, 1913.
Colorado	10,120	1,225	135.99	232	208.63	**1,457**	143.97	All fatal or otherwise, by all employers of 4 or more persons. Act Apr. 10, 1915.
Connecticut	110	2	43.48	......	......	**2**	18.18	Fatal or one day. Act May 29, 1913.
Florida	1,974	......	......	164	83.08	**164**	83.08	
Georgia	604	31	178.16	13	30.23	**44**	72.85	
Idaho	6,083	833	186.40	82	50.81	**915**	150.42	Fatal or serious. Rev. Code 1909, sec. 207
Illinois	509	108	349.51	81	405.00	**189**	371.32	Fatal or one week. Act June 28, 1913.
Iowa	271	51	204.00	2	95.24	**53**	195.57	All fatal or otherwise. Act Apr. 18, 1913.
Kansas	615	92	233.50	13	58.82	**105**	170.73	All accidents at mines employing 5 or more men. Act Mar. 14, 1911.
Kentucky	278	11	127.91	27	140.63	**38**	136.69	All accidents at mines employing 6 or more men. Act. Mar. 21, 1914.
Maine	60	......	......	4	66.67	**4**	66.67	All accidents. Act Apr. 1, 1915.
Maryland	143	11	458.33	......	......	**11**	76.92	All accidents. Act Apr. 16, 1914.
Massachusetts	34	......	......	3	272.73	**3**	88.24	All accidents. Acts June 28, 1911; June 25, 1914.
Michigan	34,061	8,105	341.81	1,205	116.44	**9,310**	273.33	All fatal or otherwise. Act Apr. 25, 1911.
Minnesota	19,152	2,351	271.29	1,341	127.88	**3,692**	192.77	Fatal or serious. Gen. Stats. 1913, par. 3924.
Missouri	14,334	2,558	241.41	447	119.58	**3,005**	209.64	Fatal or serious. Rev. Stats., 1909, sec. 8462.
Montana	19,491	4,841	320.89	503	114.19	**5,344**	274.18	All accidents. Act Mar. 8, 1915.
Nevada	7,953	1,157	221.56	294	107.65	**1,451**	182.45	Fatal or serious at mines employing wage earners. Laws of 1912.
New Hampshire	34	......	......	......	......	......	......	All required by commissioner of labor. Act Apr. 15, 1911.
New Jersey	2,031	337	220.41	84	167.33	**421**	207.29	All accidents. Laws of 1911, chap. 95.
New Mexico	4,182	327	137.57	390	216.07	**717**	171.45	
New York	3,662	1,190	540.91	121	82.76	**1,311**	358.00	All fatal or otherwise. Act Mar. 16, 1914.
North Carolina	695	83	209.60	32	107.02	**115**	165.47	
Ohio	262	34	141.67	......	......	**34**	129.77	All accidents at mines employing 5 or more men. Acts June 15, 1911; Mar. 14, 1913.
Oklahoma	1,593	244	220.42	57	117.28	**301**	188.95	All accidents at mines employing 2 or more men. Act Mar. 22, 1915.
Oregon	1,308	69	98.01	15	24.83	**84**	64.22	Fatal and all injuries causing employee to cease work, by employers of 4 or more persons. Acts Feb. 18, 1911; Feb. 25, 1913.
Pennsylvania	460	6	67.42	36	97.04	**42**	91.30	All accidents. Act June 2, 1915, effective Jan. 1, 1916.
South Carolina	153	......	......	1	6.62	**1**	6.54	
South Dakota	2,491	669	405.45	70	83.23	**739**	296.67	Fatal or serious at all mines not worked exclusively by owner or lessee. Acts Mar. 1, 1890; Mar. 4, 1915.

[a] For segregation of surface and underground employees, see Table 5, p. 32.
[b] See special paragraph, p. 84.

TABLE 12.—***ALL MINES:*** *Men employed, number injured, and number injured per 1,000 employed, by States, during the year 1916*—Continued.

State.	Employees.	Number injured.						Character of accidents that must be reported according to State law.
		Underground.	Per 1,000 employed.	On the surface.	Per 1,000 employed.	Total.	Per 1,000 employed.	
Tennessee	3,836	421	251.94	275	127.02	**696**	181.44	
Texas	943	51	136.73	211	370.18	**262**	277.84	All accidents at mines employing 6 or more men. Act Apr. 16, 1913.
Utah	7,384	1,117	238.17	1,145	425.02	**2,262**	306.34	
Vermont	155	21	181.03	9	230.77	**30**	193.55	Fatal or one day, at mines employing 11 or more men. Act Apr. 1, 1915.
Virginia	2,919	175	167.62	98	52.27	**273**	93.53	
Washington	1,239	32	41.45	16	34.26	**48**	38.74	"Any accident." Acts Mar. 14, 1911; Mar. 22, 1915.
Wisconsin	3,574	833	344.64	267	230.77	**1,100**	307.78	All "causing death or disability" by employers of 4 or more persons. Acts May 3, 1911; June 26, 1913.
Wyoming	501	6	34.48	33	100.92	**39**	77.84	All accidents at mines employing 5 or more men. Act Feb. 27, 1915.
Other States	190	....	....	84	442.11	**84**	442.11	
Total 1916.	**204,685**	**38,449**	**288.74**	**9,788**	**136.85**	**48,237**	**235.66**	

TABLE 13.—***ACTIVE OPERATORS:*** *Number reporting less than 1,000 days, and number reporting 1,000 or more days' work performed during the year ended Dec. 31, 1916.*

State.	Less than 1,000 days' work done.						1,000 or more days' work done.						**Grand total.**			
	Copper.	Iron.	Lead and zinc.	Gold, silver, and miscellaneous metal.	Nonmetal.	**Total.**	Copper.	Iron.	Lead and zinc.	Gold, silver, and miscellaneous metal.	Nonmetal.	**Total.**	**1916**	**1915**	**1914**	**1913**
Alabama	....	....	....	1	....	1	....	17	....	......	4	21	22	18	21	24
Alaska	7	....	....	150	....	157	10	....	....	261	....	271	428	367	350	350
Arizona	79	1	....	162	1	243	85	....	....	113	4	202	445	317	346	426
Arkansas	....	....	8	......	....	8	....	....	13	2	....	15	23	14	6	8
California	27	....	....	537	10	574	21	1	....	231	13	266	840	704	854	1,054
Colorado	....	....	....	347	9	356	....	3	....	368	11	382	738	384	412	1,013
Connecticut	....	....	....	......	....	....	....	1	....	......	2	3	3	5	6	5
Florida	....	....	....	......	....	....	....	....	....	......	14	14	14	13	18	27
Georgia	....	....	....	4	1	5	....	3	....	9	9	21	26	18	18	21
Idaho	45	....	....	347	2	394	17	....	....	99	....	116	510	442	526	588
Illinois	....	....	1	......	....	1	....	....	6	......	....	6	7	5	8	12
Iowa	....	....	4	......	....	4	....	....	....	......	5	5	9	6	7	9
Kansas	....	....	7	......	....	7	....	....	18	......	4	22	29	25	24	40
Kentucky	....	....	1	......	....	1	....	....	4	......	3	7	8	6	11	15
Maine	....	....	....	......	2	2	....	....	....	......	2	2	4	3	4	5
Maryland	....	....	....	......	4	4	1	2	....	1	2	6	10	9	12	16
Massachusetts	....	....	....	......	1	1	....	1	....	......	1	2	3	4	3	3
Michigan	1	....	....	......	....	1	22	47	....	......	6	75	76	80	80	84
Minnesota	....	2	....	......	....	2	....	59	....	2	....	61	63	70	57	54
Missouri	....	1	25	......	4	30	1	3	116	2	7	129	159	151	172	283
Montana	38	....	....	203	1	242	18	....	....	66	2	86	328	283	302	384
Nevada	28	....	....	203	2	233	18	2	....	151	2	173	406	401	450	566
New Hampshire	....	....	....	......	....	....	....	....	....	......	3	3	3	4	5	7
New Jersey	....	....	....	......	....	....	....	5	....	1	1	7	7	8	7	7
New Mexico	18	....	....	49	1	68	18	3	....	33	1	55	123	119	118	139
New York	....	....	....	1	4	5	....	11	....	2	19	32	37	27	34	36
North Carolina	....	....	....	5	4	9	....	2	....	2	10	14	23	23	30	60
Ohio	....	....	....	......	....	....	....	....	....	......	5	5	5	6	4	7
Oklahoma	....	....	5	......	....	5	....	....	28	......	4	32	37	32	23	36
Oregon	19	....	....	153	1	173	5	....	....	32	....	37	210	182	225	261
Pennsylvania	....	....	....	......	6	6	....	7	....	......	8	15	21	19	22	34
South Carolina	....	....	....	1	....	1	....	....	....	......	2	2	3	3	5	6
South Dakota	1	....	....	41	1	43	1	....	....	19	2	22	65	59	60	74
Tennessee	....	1	1	......	....	2	2	9	3	......	9	23	25	25	27	36
Texas	....	....	....	......	1	1	....	....	....	4	6	10	11	6	7	8
Utah	30	....	....	89	3	122	22	....	....	73	6	101	223	188	234	285
Vermont	....	....	....	......	....	....	2	....	....	......	5	7	7	6	5	10
Virginia	....	....	....	1	2	3	2	9	....	8	5	24	27	33	25	28
Washington	35	1	....	102	2	140	15	1	....	20	....	36	176	176	188	239
Wisconsin	....	....	8	......	....	8	....	5	37	......	1	43	51	33	38	61
Wyoming	12	....	....	25	3	40	4	1	....	1	3	9	49	45	60	71
Other States	....	1	....	......	1	2	....	....	....	......	2	2	4	3	1	3
Total 1916	**340**	**7**	**60**	**2,421**	**66**	**2,894**	**264**	**192**	**225**	**1,500**	**183**	**2,364**	**5,258**	......	......	.....
Total 1915	329	11	44	2,044	71	2,499	219	180	197	1,076	151	1,823	......	4,322	......	.....
Total 1914	371	15	67	2,356	78	2,887	214	181	181	1,180	162	1,918	......	......	4,805	.....
Total 1913	395	18	93	2,588	105	3,199	299	188	316	2,161	224	3,188	......	......	......	6,387

TABLE 14.—***ALL MINES:*** *Percentages of fatalities and injuries,*

PERCENTAGE KILLED.

Kind of mine.	Underground.									
	Fall of rock or ore from roof or wall.	Rock or ore while loading at working face.	Timber or hand tools.	Explosives.	Haulage accidents.	Falling down chute, winze, raise, or stope.	Run of ore from chute or pocket.	Drilling accidents.	Electricity.	Machinery (not including locomotives or drills).
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Copper	28.69	1.31	....	7.83	3.04	6.09	1.31	....	3.04	....
Gold, silver, and miscellaneous metal	30.42	2.31	.46	12.90	4.15	5.99	1.84	....	2.31	0.46
Iron	31.36	.59	.59	8.88	9.47	7.10	1.78	....	1.78	....
Lead and zinc (Mississippi Valley)	47.37	1.75	....	17.55	1.75	1.75	1.75	....	1.75	1.75
Nonmetallic mineral	20.83	....	....	12.50	....	....	....	....	4.17	....
Total, 1916	**31.13**	**1.43**	**.29**	**10.62**	**4.74**	**5.74**	**1.58**	....	**2.44**	**.29**
Total, 1915	34.54	1.81	1.27	13.02	3.25	8.14	1.81	.18	1.81	....

PERCENTAGE INJURED.

Kind of mine.	1	2	3	4	5	6	7	8	9	10
Copper	23.59	12.32	10.30	1.39	10.26	2.45	3.26	3.59	.12	.66
Gold, silver, and miscellaneous metal	19.71	10.64	7.12	1.42	9.08	3.38	1.35	6.79	.27	.56
Iron	17.25	10.95	10.58	2.70	13.82	1.30	1.50	4.27	.28	.57
Lead and zinc (Mississippi Valley)	13.64	20.12	2.45	1.05	11.04	1.32	.92	6.33	.06	1.40
Nonmetallic mineral	4.84	9.84	.95	1.04	4.75	.09	....	2.07	....	.60
Total, 1916	**19.77**	**12.34**	**8.70**	**1.68**	**10.83**	**2.20**	**2.11**	**4.67**	**.18**	**.69**
Total, 1915	18.77	12.68	9.10	.97	10.57	2.40	1.93	6.11	.20	1.27

[a] Less than one-tenth of 1 per cent.

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by causes and kinds of mines, during the year ended Dec. 31, 1916.

PERCENTAGE KILLED.

Underground—Continued.						Shaft.						
Mine fires. 11	Suffocation from natural gases. 12	Inrush of water. 13	Stepping on nail. 14	Other causes. 15	**Total, underground.**	Falling down shafts. 16	Objects falling down shafts. 17	Breaking of cables. 18	Overwinding. 19	Skip or cage. 20	Other causes. 21	**Total, shaft.**
10.00	0.43	....	....	3.48	**65.22**	7.39	0.87	....	....	5.65	2.61	**16.52**
1.84	1.84	....	....	4.61	**69.13**	7.37	2.77	0.92	0.92	5.07	1.38	**18.43**
....	.59	.59	.59	2.36	**65.68**	4.73	4.14	....	....	4.14	....	**13.01**
....	....	....	1.75	....	**77.19**	7.02	5.27	....	....	1.75	....	**14.04**
....	....	....	....	4.17	**41.67**	....	....	....	....	4.17	....	**4.17**
3.87	**.86**	**.14**	**.29**	**3.30**	**66.72**	**6.46**	**2.58**	**.29**	**.29**	**4.73**	**1.29**	**15.64**
....	.54	.54	.18	.54	**67.63**	6.15	2.35	.36	.18	3.62	1.27	**13.93**

PERCENTAGE INJURED.

Underground—Continued.						Shaft.						
Mine fires. 11	Suffocation from natural gases. 12	Inrush of water. 13	Stepping on nail. 14	Other causes. 15	**Total, underground.**	Falling down shafts. 16	Objects falling down shafts. 17	Breaking of cables. 18	Overwinding. 19	Skip or cage. 20	Other causes. 21	**Total, shaft.**
0.01	0.06	....	1.18	11.86	**81.05**	0.21	0.44	....	(*a*)	0.28	0.54	**1.47**
.05	.16	.01	2.08	15.07	**77.69**	.55	.89	.04	.03	1.06	1.09	**3.66**
....	.05	.03	1.50	10.34	**75.14**	.20	.52	....	.02	.94	.85	**2.53**
.29	.06	....	2.41	14.00	**75.09**	.19	2.12	.02	.02	1.70	1.40	**5.45**
....	....	....	.60	7.77	**32.55**	.17	.35	....	....	.17	.52	**1.21**
.04	**.08**	**.01**	**1.55**	**12.28**	**77.13**	**.27**	**.72**	**.01**	**.01**	**.75**	**.82**	**2.58**
.12	.23	.10	1.94	12.64	**79.03**	.17	.77	.01	.01	.73	.68	**2.37**

TABLE 14.—***ALL MINES:*** *Percentages of fatalities and injuries, by causes*

PERCENTAGE KILLED.

Kind of mine.	Surface.									
	Mine cars, mine locomotives, or aerial trams. 22	Railway cars and locomotives. 23	Run or fall of ore in or from ore bins. 24	Falls of persons. 25	Stepping on nail. 26	Hand tools, axes, bars, etc. 27	Electricity. 28	Machinery. 29	Other causes. 30	**Total, surface.**
Copper	1.31	1.31	......	1.74	......	......	0.43	2.17	2.17	**9.13**
Gold, silver, and miscellaneous metal	.46	.46	......	1.38	......	......	2.31	.92	5.99	**11.52**
Iron	2.96	.59	0.59	3.55	0.59	......	......	1.19	2.36	**11.83**
Lead and zinc (Mississippi Valley)	......	......	......	3.51	......	......	1.75	1.75	1.75	**8.77**
Nonmetallic mineral	......	......	4.17	......	......	4.17	......	8.33	4.17	**20.83**
Total, 1916	**1.29**	**.72**	**.29**	**2.15**	**.14**	**.14**	**1.01**	**1.72**	**3.44**	**10.90**
Total, 1915	.72	1.27	.36	.54	......	......	.18	1.09	4.52	**8.68**

PERCENTAGE INJURED.

Kind of mine.	Mine cars, mine locomotives, or aerial trams. 22	Railway cars and locomotives. 23	Run or fall of ore in or from ore bins. 24	Falls of persons. 25	Stepping on nail. 26	Hand tools, axes, bars, etc. 27	Electricity. 28	Machinery. 29	Other causes. 30	**Total, surface.**
Copper	0.68	0.20	0.22	1.04	0.40	1.08	0.11	0.80	5.61	**10.14**
Gold, silver, and miscellaneous metal	1.31	.27	.18	1.28	.86	1.75	.15	1.42	5.39	**12.61**
Iron	1.10	.58	.17	1.48	.73	1.82	.08	1.27	5.55	**12.78**
Lead and zinc (Mississippi Valley)	.71	.52	.63	2.14	2.01	1.95	.13	2.05	7.88	**18.02**
Nonmetallic mineral	3.45	1.21	1.04	3.28	8.38	10.10	.43	4.06	15.03	**46.98**
Total, 1916	**.99**	**.36**	**.26**	**1.36**	.93	**1.71**	**.12**	**1.25**	**6.00**	12.98
Total, 1915	.62	.24	.29	1.17	.75	1.63	.14	1.12	5.01	**10.97**

and kinds of mines, during the year ended Dec. 31, 1916—Continued.

PERCENTAGE KILLED.

Open pit.												Grand total.
Falls or slides of rock or ore.	Explosives.	Haulage accidents (locomotives, etc.).	Steam shovels.	Falls of persons.	Falls of derricks, booms, etc.	Run or fall of ore in or from ore bins.	Machinery (other than locomotives or steam shovels).	Electricity.	Hand tools.	Other causes.	**Total, open pit.**	
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**		
2.17	2.61	3.04	......	......	......	......	......	0.43	......	0.87	**9.12**	**100.00**
......	......	.46	......	......	......	......	0.46	......	......	......	**.92**	**100.00**
1.19	3.55	2.96	0.59	......	0.59	......	......	......	......	.59	**9.47**	**100.00**
......	......	......	......	......	......	......	......	......	......	......	......	**100.00**
4.17	12.50	......	......	8.33	......	......	......	4.17	......	4.17	**33.33**	**100.00**
1.15	2.15	1.87	.14	.29	.14	......	.14	.29	......	.57	**6.74**	**100.00**
2.17	1.09	3.43	.18	1.09	.18	......	.36	.54	......	.72	**9.76**	**100.00**

PERCENTAGE INJURED.

Open pit.												Grand total.
1.57	0.04	0.55	0.18	0.23	0.02	(*a*)	0.13	0.01	0.39	4.22	**7.34**	**100.00**
.35	.04	.11	......	.82	......	......	1.34	.02	1.07	2.29	**6.04**	**100.00**
1.22	.34	1.68	1.21	.78	.03	.08	.22	.03	1.03	2.93	**9.55**	**100.00**
.27	.02	.52	.04	.06	......	.06	.02	......	.10	.34	**1.44**	**100.00**
2.68	.60	2.59	.35	1.81	......	.52	1.47	.26	2.59	6.39	**19.26**	**100.00**
1.12	.13	.78	.39	.51	.01	.04	.43	.02	.72	3.16	**7.31**	**100.00**
1.52	.13	.65	.27	.72	.03	.04	.47	.03	.78	2.99	**7.63**	**100.00**

Table 15.—*ALL MINES, 1915:* *Men employed, number killed, and number killed per 1,000 employed, and days worked, by States, during the year ended Dec. 31, 1915.*

State.	Number of active operators reporting.	Number of employees.			Days' work done.	Average number of days worked.	Number killed.						Widows.	Orphans.
		Underground.	On the surface.	**Total.**			Underground.[a]	Per 1,000 employed.	On the surface.	Per 1,000 employed.	**Total.**	Per 1,000 employed.		
Alabama	18	2,833	2,123	**4,956**	1,331,512	269	7	2.47	5	2.36	**12**	2.42	7	2
Alaska	367	3,420	4,705	**8,125**	1,713,859	211	18	5.26	4	.85	**22**	2.71	8	9
Arizona	317	10,211	3,846	**14,057**	4,151,671	295	40	3.92	1	.26	**41**	2.92	16	37
Arkansas	14	162	523	**685**	163,165	238	1	6.17			**1**	1.46	1	2
California	704	6,271	4,143	**10,414**	3,163,407	304	34	5.42	15	3.62	**49**	4.71	17	24
Colorado	384	4,702	1,667	**6,369**	1,930,586	303	46	9.78	3	1.80	**49**	7.69	22	35
Connecticut	5	36	72	**108**	26,544	246								
Florida	13		1,737	**1,737**	441,908	254			3	1.73	**3**	1.73	1	1
Georgia	18	70	225	**295**	62,758	213	1	14.29			**1**	3.39	1	6
Idaho	442	3,860	1,330	**5,190**	1,386,965	267	23	5.96	2	1.50	**25**	4.82	6	10
Illinois	5	263	121	**384**	114,881	299	3	11.41			**3**	7.81	3	4
Iowa	6	170	44	**214**	47,004	220	2	11.76			**2**	9.35	1	1
Kansas	25	295	140	**435**	74,704	172	1	3.39	1	7.14	**2**	4.60	1	1
Kentucky	6	88	86	**174**	42,175	242								
Maine	3		105	**105**	19,835	189								
Maryland	9	20	203	**223**	47,303	212								
Massachusetts	4	24	62	**86**	20,350	237								
Michigan	80	19,292	8,220	**27,512**	7,942,080	289	93	4.82	6	.73	**99**	3.60	69	151
Minnesota	70	7,611	6,961	**14,572**	3,979,111	273	20	2.63	16	2.30	**36**	2.47	25	48
Missouri	151	7,215	2,355	**9,570**	2,506,376	262	40	5.54	4	1.70	**44**	4.60	15	14
Montana	283	10,809	3,037	**13,846**	4,103,700	296	41	3.79	21	6.91	**62**	4.48	31	54
Nevada	401	3,347	2,366	**5,713**	1,726,012	302	14	4.18	4	1.69	**18**	3.15	6	14
New Hampshire	4	10	31	**41**	10,125	247								
New Jersey	8	1,259	486	**1,745**	539,417	309	8	6.35	1	2.06	**9**	5.16	5	15
New Mexico	119	1,387	1,345	**2,732**	751,056	275	3	2.16	1	.74	**4**	1.46	3	6
New York	27	1,549	1,009	**2,558**	690,256	270	8	5.16			**8**	3.13	5	6
North Carolina	23	350	277	**627**	148,614	237								
Ohio	6	219	46	**265**	66,613	251	2	9.13			**2**	7.55	1	
Oklahoma	32	623	232	**855**	204,973	240	4	6.42			**4**	4.68	1	
Oregon	182	579	491	**1,070**	223,416	209			2	4.07	**2**	1.87		
Pennsylvania	19	62	322	**384**	95,549	249			1	3.11	**1**	2.60	1	3
South Carolina	3	3	484	**487**	116,933	240								
South Dakota	59	1,450	346	**1,796**	583,497	325	6	4.14			**6**	3.34	5	5
Tennessee	25	1,302	1,519	**2,821**	708,870	251	7	5.38	1	.66	**8**	2.84	7	13
Texas	6	210	84	**294**	89,988	306			1	11.90	**1**	3.40	1	
Utah	188	3,214	2,235	**5,449**	1,825,854	335	16	4.98	7	3.13	**23**	4.22	9	6
Vermont	6	71	27	**98**	27,492	281	1	14.08			**1**	10.20	1	2

Virginia	33	918	1,058	**1,976**	434,968	220	....	....	1	.95	**1**	.51	1	2
Washington	176	447	268	**715**	113,009	158	4	8.95	....	....	**4**	5.59	1	2
Wisconsin	33	1,703	948	**2,651**	742,653	280	7	4.11	1	1.05	**8**	3.02	3	11
Wyoming	45	158	228	**386**	88,849	230	1	6.33	1	4.39	**2**	5.18	1	....
Other States	3	10	388	**398**	140,977	354	....	....	....	....	**0**	....	....	....
Total, 1915	**4,322**	**96,223**	**55,895**	**152,118**	**42,599,015**	**280**	**451**	**4.69**	**102**	**1.82**	**553**	**3.64**	**275**	**484**

a Includes shaft accidents.

METAL-MINE FATALITY RATES COMPARED ON BASIS OF YEAR OF 300 WORKING DAYS.

As a mine can be worked only about 300 days in a year, if Sundays, holidays, and a few days for repairs be excluded, a comparison of the accident and fatality rates at metal mines in the various States on a 300-day basis is presented in Table 16. The number of days actually worked at the metal mines in the various States during the year 1916 ranged from 132 in Kentucky to 320 in Colorado, the average for the United States being 282, as compared with 280 in 1915, and 271 in 1914.

A true comparison of occupational risk can not be made without reducing the number of days operated to a common denominator. In order to obtain the number of 300-day workers, it is necessary to know the total number of shifts (days) of labor performed during the year, as given in Table 5. A still better comparison could be made if data showing the actual number of hours' labor performed were available.

The first column (Table 16) under "Number of fatalities" shows the rate based on the actual number of men reported as working, and the second column shows the rate for an equivalent number of 300-day workers. A similar comparison is given for the nonfatal injuries.

Fatality rates for 1916 in the various branches of the mineral industry in the United States, on both the actual-time basis and on the 300-day basis, are compared in the accompanying table.

TABLE 16.—***ALL MINES:*** *Fatality and injury rates based upon actual time men were employed, and corresponding rates based upon a uniform year of 300 working days.*

State.	Average days worked, 1916.	Men employed.		Number of fatalities per 1,000 employed.		Number of injuries per 1,000 employed.	
		Actual number.	Equivalent in 300-day workers (calculated).	As reported.	On 300-day basis.	As reported.	On 300-day basis.
Alabama	294	7,360	7,208	3.67	3.75	273.51	279.27
Alaska	213	8,193	5,818	3.54	4.98	80.19	112.93
Arizona	303	21,421	21,664	3.17	3.14	342.65	338.81
Arkansas	233	1,012	787	.99	1.27	128.46	165.18
California	283	13,295	12,561	3.16	3.34	282.14	298.62
Colorado	320	10,120	10,787	6.23	5.84	143.97	135.07
Connecticut	257	110	94	....	....	18.18	21.28
Florida	253	1,974	1,662	2.03	2.41	83.08	98.68
Georgia	196	604	394	6.62	10.15	72.85	111.68
Idaho	261	6,083	5,284	2.47	2.84	150.42	173.16
Illinois	247	509	418	7.86	9.59	371.32	452.15
Iowa	258	271	233	3.69	4.29	195.57	227.47
Kansas	256	615	524	4.88	5.73	170.73	200.38
Kentucky	132	278	122	....	....	136.69	311.48
Maine	282	60	56	....	....	66.67	71.43
Maryland	146	143	70	....	....	76.92	157.14
Massachusetts	247	34	28	....	....	88.24	107.14
Michigan	300	34,061	34,032	3.76	3.76	273.33	273.57
Minnesota	254	19,152	16,233	2.19	2.59	192.77	227.44
Missouri	273	14,334	13,067	2.44	2.68	209.64	229.97
Montana	297	19,491	19,310	3.85	3.88	274.18	276.75
Nevada	274	7,953	7,271	3.77	4.13	182.45	199.56
New Hampshire	273	34	31	....	....	....	....
New Jersey	307	2,031	2,079	3.94	3.85	207.29	202.50
New Mexico	282	4,182	3,938	5.02	5.33	171.45	182.07
New York	286	3,662	3,496	4.37	4.58	358.00	375.00
North Carolina	241	695	558	....	....	165.47	206.09
Ohio	266	262	232	3.82	4.31	129.77	146.55
Oklahoma	219	1,593	1,163	3.14	4.30	188.95	258.81
Oregon	205	1,308	893	.76	1.12	64.22	94.06
Pennsylvania	253	460	387	8.70	10.34	91.30	108.53
South Carolina	274	153	140	....	....	6.54	7.14
South Dakota	315	2,491	2,616	2.41	2.29	296.67	282.49
Tennessee	259	3,836	3,306	2.87	3.33	181.44	210.53
Texas	351	943	1,105	2.12	1.81	277.84	237.10
Utah	318	7,384	7,817	3.25	3.07	306.34	289.37
Vermont	275	155	142	12.90	14.08	193.55	211.27
Virginia	258	2,919	2,512	1.03	1.19	93.53	108.68
Washington	168	1,239	694	2.42	4.32	38.74	69.16
Wisconsin	262	3,574	3,126	4.76	5.44	307.78	351.89
Wyoming	232	501	387	2.00	2.58	77.84	100.78
Other States	331	190	210	5.26	4.76	442.11	400.00
Total, 1916	282	204,685	192,455	3.41	3.62	235.66	250.64
Total, 1915	280	152,118	141,997	3.64	3.89	232.02	248.56
Total, 1914	271	158,115	142,619	3.54	3.92	191.10	211.87
Total, 1913	288	191,276	183,593	3.57	3.72	172.37	179.59
Total, 1912	287	169,199	161,662	3.91	4.09	181.65	190.11
Total, 1911	282	165,979	156,089	4.19	4.45	160.13	170.27

ACCIDENTS CLASSIFIED BY MINING METHODS.

In the bureau's report[a] for 1914 data relating to mine accidents were classified by mining methods for the first time. Similar data for 1915 and 1916 have been collected, thus placing the results of three years' work on a comparative basis.

Data on the classification of accidents according to systems of mining are essential for ascertaining the risk in the different mining methods. The bureau's accident-report cards, sent to the operators during the past three years, requested that the method of mining be reported with the statistics of accidents. With these reports as a basis, the bureau was able to select the returns from 258 mining companies in 1914, 280 in 1915, and 246 in 1916, representing approximately 75 per cent of the metal-mining industry, whose records appear reasonably complete. Reports from companies whose data were not reasonably complete in all details were omitted in this study. The figures given herein, therefore, include the actual number of men employed underground and in open-pit mines (excluding yard and shop men), with the corresponding number of accidents for each group. (See Table 17.)

Various methods of mining have been developed to work different types of ore bodies, and it is necessary to modify these methods to meet the requirements of each ore body if the ore is to be extracted at minimum cost and with least loss. Safety should be the first consideration, although many other factors have to be taken into account in laying out a mine. For the purpose of studying the mining hazard on the basis of mining methods, the returns received from the operators have been divided into six groups, as follows:

Operators' reports grouped by mining methods.

	Number of operators.
1. Room and pillar	62
2. Overhand stoping:	
(*a*) With stulls	22
(*b*) With square sets, cribs, etc.	32
(*c*) With filling	21
(*d*) Shrinkage	13
3. Underhand stoping	5
4. Caving methods	61
5. Open pit, with steam shovel	23
6. Open pit, without steam shovel	7
Total	246

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[a] Fay, A. H., Metal-mine accidents in the United States during the calendar year 1914; Tech. Paper 129, Bureau of Mines, 1916, 96 pp.

Original from PRINCETON UNIVERSITY

ROOM-AND-PILLAR METHOD.

The figures for room-and-pillar mining represent 62 companies employing 9,023 men under ground. These mines include 27 lead and zinc mines in the Mississippi Valley, 5 iron mines in Alabama, 1 each in Michigan and Minnesota, 3 in New York, and 3 in Wisconsin. Also 2 copper mines in California, 2 gypsum mines in Michigan, 1 in Iowa, 2 salt mines and 2 talc mines in New York.

TABLE 17.—*Summary of metal mine accident data grouped by methods of mining during the year ended Dec. 31, 1916.*

Method of mining.	Number companies represented.	Number States represented.	Days active.	Total days labor.	Number men employed in mines.	Number 300-day workers.	Number killed.			Number injured.		
							Total.	Per 1,000 employed.	Per 1,000 300-day workers.	**Total.**	Per 1,000 employed.	Per 1,000 300-day workers.
1. Room and pillar	62	14	280	2,522,986	9,023	8,410	**47**	5.21	5.59	**4,013**	444.90	477.17
2. Overhand stoping:												
(a) *With stulls*	*22*	*7*	*324*	*1,385,778*	*4,281*	*4,619*	**21**	*4.91*	*4.55*	**1,824**	*426.17*	*394.81*
(b) *With square sets, cribs, etc*	*32*	*10*	*326*	*4,695,937*	*14,385*	*15,653*	**55**	*3.82*	*3.51*	**7,661**	*532.38*	*489.52*
(c) *With filling*	*21*	*10*	*329*	*2,031,454*	*6,170*	*6,771*	**35**	*5.67*	*5.17*	**2,584**	*418.80*	*381.68*
(d) *Shrinkage*	*13*	*7*	*351*	*958,754*	*2,729*	*3,196*	**14**	*5.13*	*4.38*	**1,129**	*413.56*	*352.81*
3. Underhand stoping	5	5	306	1,113,333	3,635	3,711	**12**	3.30	3.23	**1,707**	496.43	460.11
4. Caving methods	61	7	301	6,121,033	20,326	20,403	**80**	3.93	3.92	**7,134**	350.91	349.71
5. Open pit, with steam shovel	23	7	283	2,574,733	9,100	8,582	**27**	2.97	3.15	**2,416**	265.49	281.58
6. Open pit, without steam shovel	7	5	265	92,319	348	308	....	....	....	**108**	308.57	348.39
Total, 1916	**246**	....	**307**	**21,496,327**	69,997	71,653	**291**	4.16	4.06	**28,576**	408.23	398.82
1915	280	....	303	22,842,999	75,365	76,140	**324**	4.29	4.25	**27,314**	362.42	358.73
1914	258	....	292	22,004,824	75,453	73,349	**361**	4.78	4.92	**24,306**	322.13	331.38

The accompanying table shows the number killed and the number injured during the years 1914 to 1916, inclusive, together with the fatality and injury rate per 1,000 300-day workers.

Number killed and injured in mines using **room-and-pillar** *method of mining during the calendar years 1914, 1915, and 1916.*

Cause.	Killed.			Injured.		
	1914	1915	1916	1914	1915	1916
Falls of rock	22	17	21	465	401	591
Run of ore in stope, chute, or bin	1	....	....	726	746	998
Explosives	8	7	9	70	45	58
Haulage	8	....	7	718	429	793
Falls of persons	2	1	2	54	29	68
Miscellaneous	4	....	2	1,057	1,045	1,273
Shaft	3	2	6	81	124	232
Total	48	27	47	3,171	2,819	4,013
Per 1,000 300-day workers	5.73	3.97	5.59	378.63	413.95	477.17

OVERHAND STOPING.

Overhand stoping is widely used and has many variations in practice, as is indicated by Table 17, where the figures represent 22 mines in which the principal timbering is with stulls, 32 with square sets, 21 with filling, and 13 with shrinkage stoping. The table also shows a higher fatality rate where the filling method is used, and a higher rate of nonfatal injuries where square sets are chiefly employed.

The accompanying table gives the combined figures for the four subdivisions under overhand stoping, showing a decrease in the fatality rate from 5.11 per 1,000 300-day workers in 1914 to 4.13 in 1916. The increase in injuries does not necessarily represent an increased hazard, but the better-kept records that are bringing out the true dangers of the industry.

TABLE 18.—***FATALITIES,*** *classified by principal causes and mining methods, during the years ended Dec. 31, 1915 and 1916.*

Method of mining.	Number killed.																						
	By falls of rock.			By run or fall of ore while loading at chute, bin, or working face.			By explosives.			By haulage.			By falls of persons.			Miscellaneous.			In shaft.			Total.	
	1 and 31.			**2, 7, and 37.**			**4 and 32.**			**5 and 33.**			**6 and 35.**			**3, 8, 9, 10, 11, 12, 13, 14, 15, 34, 36, 38, 39, 40, and 41.**			**16, 17, 18, 19, 20, and 21.**				
	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	**Number.**	Rate per 1,000 300-day workers.
1916.																							
Room and pillar	21	44.68	2.50	......	......	......	9	19.15	1.07	7	14.90	0.83	2	4.25	0.24	2	4.25	0.24	6	12.77	0.71	**47**	5.59
Overhand stoping	51	40.80	1.69	5	4.00	.16	10	8.00	.33	6	4.80	.20	5	4.00	16	16	12.80	.53	32	25.60	1.06	**125**	4.13
(a) *With stulls*	*4*	*19.05*	*.87*	*2*	*9.52*	*.43*	*1*	*4.76*	*.22*	*1*	*4.76*	*.22*	*2*	*9.52*	*.43*	*4*	*19.05*	*.87*	*7*	*33.34*	*1.51*	*21*	*4·55*
(b) *With square sets, cribs, etc*	*25*	*45.45*	*1.60*	*1*	*1.82*	*.06*	*3*	*5.45*	*.19*	*3*	*5.45*	*.19*	*2*	*3.64*	*.13*	*8*	*14.55*	*.51*	*13*	*23.64*	*.83*	*55*	*3.51*
(c) *With filling*	*13*	*37.15*	*1.92*	*2*	*5.71*	*.30*	*2*	*5.71*	*.30*	*2*	*5.71*	*.30*	*1*	*2.86*	*.14*	*4*	*11.43*	*.59*	*11*	*31.43*	*1.62*	*35*	*5.17*
(d) *Shrinkage*	*9*	*64.28*	*2.82*	......	......	......	*4*	*28.57*	*1.35*	......	......	......	......	......	......	......	......	......	*1*	*7.15*	*.31*	*14*	*4.38*
Underhand stoping	3	25.00	.81	1	8.33	.27	3	25.00	.81	2	16.67	.53	1	8.33	.27	1	8.33	.27	1	8.33	.27	**12**	3.23
Caving methods	34	42.50	1.66	3	3.75	.15	13	16.25	.64	8	10.00	.39	7	8.75	.34	2	2.50	.10	13	16.25	.64	**80**	3.92
Open pit, with steam shovel	5	18.52	.58	......	......	......	7	25.93	.82	11	40.74	1.28	......	......	......	4	14.81	.47	......	......	......	**27**	3.15
Open pit, without steam shovel	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Total, 1916	**114**	**39.18**	**1.59**	**9**	**3.09**	**.12**	**42**	**14.43**	**.59**	**34**	**11.68**	**.47**	**15**	**5.16**	**.21**	**25**	**8.59**	**.35**	**52**	**17.87**	**.73**	**291**	**4.06**

1915.																							
Room and pillar	17	62.96	2.50				7	25.93	1.03				1	3.70	0.15				2	7.41	0.29	**27**	3.97
Overhand stoping	89	46.35	2.17	10	5.21	0.24	16	8.33	.39	9	4.69	0.22	21	10.94	.51	13	6.77	0.32	34	17.71	.83	**192**	4.69
(a) *With stulls*	*4*	*40.00*	*1.67*										*2*	*20.00*	*.83*				*4*	*40.00*	*1.67*	*10*	*4.17*
(b) *With square sets, cribs, etc*	*26*	*55.31*	*2.56*	*1*	*2.13*	*.10*	*2*	*4.26*	*.20*				*5*	*10.64*	*.49*	*3*	*6.38*	*.30*	*10*	*21.28*	*.99*	*47*	*4.64*
(c) *With filling*	*44*	*44.45*	*1.94*	*5*	*5.05*	*.22*	*10*	*10.10*	*.44*	*6*	*6.06*	*.27*	*9*	*9.09*	*.40*	*10*	*10.10*	*.44*	*15*	*15.15*	*.66*	*99*	*4.37*
(d) *Shrinkage*	*15*	*41.67*	*2.61*	*4*	*11.11*	*.70*	*4*	*11.11*	*.70*	*3*	*8.33*	*.52*	*5*	*13.89*	*.87*				*5*	*13.89*	*.87*	*36*	*6.27*
Underhand stoping	7	63.64	3.64	1	9.09	.52	1	9.09	.52	1	9.09	.52							1	9.09	.52	**11**	5.72
Caving methods	34	50.74	1.92	4	5.97	.23	8	11.94	.45	2	2.99	.11	8	11.94	.45	7	10.45	.40	4	5.97	.23	**67**	3.79
Open pit, with steam shovel	4	16.67	.53				1	4.17	.13	16	66.66	2.10				3	12.50	.39				**24**	3.15
Open pit, without steam shovel	1	33.33	.84										1	33.33	.84	1	33.33	.84				**3**	2.53
Total, 1915	152	46.91	2.00	15	4.63	.20	33	10.19	.43	28	8.64	.37	31	9.26	.41	24	7.72	.31	41	12.65	.54	**324**	4.26
Total, 1914	150	41.55	2.05	6	1.66	.08	40	11.08	.54	34	9.42	.46	33	9.14	.45	27	7.48	.37	71	19.67	.97	**361**	4.92

TABLE 19.—***INJURIES,*** *classified by principal causes and mining methods, during the years ended Dec. 31, 1915 and 1916.*

Method of mining.	Number injured.																							
	By falls of rock.			By run or fall of ore while loading at chute, bin, or working face.			By explosives.			By haulage.			By falls of persons.			Miscellaneous.			In shaft.			Total.	
	1 and 31.			**2, 7, and 37.**			**4 and 32.**			**5 and 33.**			**6 and 35.**			**3, 8, 9, 10, 11, 12, 13, 14, 15, 34, 36, 38, 39, 40, and 41.**			**16, 17, 18, 19, 20, and 21.**				
	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	**Number.**	Rate per 1,000 300-day workers.
1916.																							
Room and pillar	591	14.73	70.27	998	24.87	118.67	58	1.45	6.90	793	19.76	94.29	68	1.69	8.09	1,273	31.72	151.37	232	5.78	27.58	**4,013**	477.17
Overhand stoping	3,431	26.00	113.46	2,717	20.59	89.85	204	1.54	6.75	1,604	12.15	53.04	354	2.68	11.71	4,525	34.29	149.64	363	2.75	12.00	**13,198**	436.44
(*a*) *With stulls*	*430*	*23.57*	*93.07*	*290*	*15.90*	*62.77*	*20*	*1.10*	*4.33*	*186*	*10.20*	*40.26*	*66*	*3.62*	*14.29*	*779*	*42.71*	*168.62*	*53*	*2.90*	*11.47*	*1,824*	*394.81*
(*b*) *With square sets, cribs, etc*	*2,191*	*28.60*	*140.00*	*1,502*	*19.61*	*95.97*	*142*	*1.85*	*9.07*	*985*	*12.86*	*62.94*	*166*	*2.17*	*10.61*	*2,471*	*32.25*	*157.89*	*204*	*2.66*	*13.04*	*7,661*	*489.52*
(*c*) *With filling*	*668*	*25.85*	*98.67*	*546*	*21.13*	*80.65*	*22*	*.85*	*3.25*	*300*	*11.61*	*44.31*	*100*	*3.87*	*14.77*	*880*	*34.06*	*129.99*	*68*	*2.63*	*10.04*	*2,584*	*381.68*
(*d*) *Shrinkage*	*142*	*12.58*	*44.38*	*379*	*33.57*	*118.44*	*20*	*1.77*	*6.25*	*133*	*11.78*	*41.56*	*22*	*1.95*	*6.87*	*395*	*34.99*	*123.44*	*38*	*3.36*	*11.87*	*1,129*	*352.81*
Underhand stoping	95	5.56	25.61	524	30.70	141.24	217	12.71	58.49	365	21.38	98.38	24	1.41	6.47	459	26.89	123.72	23	1.35	6.20	**1,707**	460.11
Caving methods	1,962	27.50	96.18	889	12.46	43.58	173	2.42	8.48	978	13.71	47.94	124	1.74	6.08	2,795	39.18	137.01	213	2.99	10.44	**7,134**	349.71
Open pit, with steam shovel	402	16.64	46.85	9	.37	1.05	41	1.70	4.78	287	11.88	33.45	129	5.34	15.03	1,548	64.07	180.42	......	......	......	**2,416**	281.58
Open pit, without steam shovel	26	24.07	83.87	3	2.78	9.68	5	4.63	16.13	34	31.48	109.68	2	1.85	6.45	38	35.19	122.58	......	......	......	**108**	348.39
Total, 1916	**6,507**	**22.77**	**90.82**	**5,140**	**17.99**	**71.74**	**698**	**2.44**	**9.74**	**4,061**	**14.21**	**56.68**	**701**	**2.45**	**9.78**	**10,638**	**37.23**	**148.47**	**831**	**2.91**	**11.60**	**28,576**	**398.83**

1915.																						
Room and pillar	401	14.22	58.88	746	26.46	109.54	45	1.60	6.61	429	15.22	63.00	29	1.03	4.26	1,045	37.07	153.45	124	4.40	18.21	2,819	413.95
Overhand stoping	3,579	22.84	87.42	2,922	18.65	71.38	134	.86	3.27	1,771	11.30	43.26	519	3.31	12.68	6,391	40.79	156.11	352	2.25	8.60	15,668	382.72
(a) *With stulls*	*148*	*11.47*	*61.67*	*99*	*7.68*	*41.25*	*11*	*.85*	*4.58*	*130*	*10.08*	*54.16*	*24*	*1.86*	*10.00*	*862*	*66.82*	*359.17*	*16*	*1.24*	*6.67*	*1,290*	*537.50*
(b) *With square sets, cribs, etc*	*1,041*	*23.24*	*102.65*	*1,319*	*29.44*	*130.07*	*46*	*1.03*	*4.54*	*565*	*12.61*	*55.71*	*94*	*2.10*	*9.27*	*1,309*	*29.22*	*129.08*	*106*	*2.36*	*10.45*	*4,480*	*441.77*
(c) *With filling*	*1,887*	*24.65*	*83.29*	*1,072*	*14.01*	*47.32*	*36*	*.47*	*1.59*	*854*	*11.16*	*37.69*	*335*	*4.38*	*14.79*	*3,315*	*43.31*	*146.32*	*155*	*2.02*	*6.84*	*7,654*	*337.84*
(d) *Shrinkage*	*503*	*22.42*	*87.61*	*432*	*19.25*	*75.25*	*41*	*1.83*	*7.14*	*222*	*9.89*	*38.67*	*66*	*2.94*	*11.50*	*905*	*40.33*	*157.64*	*75*	*3.34*	*13.06*	*2,244*	*390.87*
Underhand stoping	53	5.43	27.58	248	25.41	129.03	17	1.75	8.84	329	33.71	171.18	6	.62	3.12	312	31.96	162.33	11	1.13	5.72	976	507.81
Caving methods	1,879	32.39	106.29	486	8.38	27.49	66	1.14	3.73	794	13.69	44.91	142	2.45	8.03	2,267	39.08	128.23	167	2.88	9.45	5,801	328.13
Open pit, with steam shovel	449	23.53	59.02	8	.42	1.05	38	1.99	4.99	194	10.17	25.50	179	9.38	23.53	1,040	54.50	136.70	......	......	......	1,908	250.97
Open pit, without steam shovel	16	11.27	13.53	1	.70	.84	1	.70	.84	22	15.49	18.60	9	6.34	7.61	93	65.49	78.61	......	......	......	142	120.03
Total, 1915	6,377	23.35	83.75	4,411	16.15	57.93	301	1.10	3.95	3,539	12.96	46.48	884	3.24	11.61	11,148	40.81	146.42	654	2.39	8.59	27,314	358.73
Total, 1914	6,054	24.91	82.54	3,847	15.83	52.45	386	1.59	5.26	3,342	13.75	45.56	1,002	4.12	13.66	9,104	37.45	124.12	571	2.35	7.78	24,306	331.37

The data for the 22 mines in which stulls are the principal method of timbering are from returns from 2 copper mines in Arizona and 5 in Michigan, 1 iron mine in Michigan, and 1 in New York; and 13 precious-metal mines in the Western States. The use of stulls is confined principally to narrow veins and lodes.

Number killed and injured in mines where **overhand stoping** *is principal method used during the calendar years 1914, 1915, and 1916.*

Cause.	Killed.			Injured.		
	1914	1915	1916	1914	1915	1916
Fall of rock	77	89	51	3,060	3,579	3,431
Run of ore in stope, chute, or bin	3	10	5	2,520	2,922	2,717
Explosives	17	16	10	125	134	204
Haulage	8	9	6	1,544	1,771	1,604
Falls of persons	25	21	5	556	519	354
Miscellaneous	8	13	16	4,277	6,391	4,525
Shaft	43	35	32	290	352	363
Total	181	193	125	12,372	15,668	13,198
Per 1,000 300-day workers	5.11	4.71	4.13	345.91	382.72	436.44

The 32 reports from mines using the square-set method of timbering cover 6 copper mines in Arizona, 1 in California, 10 in Michigan, 3 in Minnesota, 2 in Utah, and 9 precious-metal mines scattered throughout the Rocky Mountain States.

The figures for the filling method are from 21 companies and include 1 copper mine in California and 7 in Michigan; 1 iron mine in Minnesota; 5 silver-lead-zinc mines in Idaho, and 6 precious-metal mines in the Western States.

The mines under shrinkage stoping include 3 copper and 3 gold mines in California; 2 gold mines in Alaska; 1 copper mine in Arizona; 1 iron mine in Michigan and 1 in New Jersey.

UNDERHAND STOPING.

In the accompanying table are separate data on underhand stoping, including the returns of 5 companies that in 1916 employed 3,635 men. These represent 4 iron mines, 1 each in Minnesota, Alabama, Colorado, and New York; and 1 zinc mine in Missouri. The number of men killed was 12. The number of injuries was 1,707, or 460.11 per 1,000 300-day workers.

Number killed and injured in mines where **underhand stoping** *is principal method used during the calendar years 1914, 1915, and 1916.*

Cause.	Killed.			Injured.		
	1914 [a]	1915	1916	1914 [a]	1915	1916
Falls of rock	....	7	3	....	53	95
Run of ore in stope, chute, or bin	....	1	1	....	248	524
Explosives	....	1	3	....	17	217
Haulage	....	1	2	....	329	365
Falls of persons	....	....	1	....	6	24
Miscellaneous	....	....	1	....	312	459
Shaft	....	1	1	....	11	23
Total	....	11	12	....	976	1,707
Per 1,000 300-day workers	....	5.72	3.23	....	507.80	460.11

[a] No data available.

CAVING SYSTEMS.

The data relating to this system of mining represent the returns of 61 companies operating mines in 7 different States and employing 20,326 men, and include largely the iron mines of Minnesota and Michigan, and a number of copper mines in Arizona, California, and Utah.

Many different names are applied to caving systems, but the principle is similar for all. The methods comprised in this classification are top slicing, substoping, block caving, pillar caving, etc., and the preliminary work that is absolutely necessary for any caving system.

The fatality and injury rates for this group of mines, for 1914 to 1916, inclusive, are shown in the accompanying table.

Number killed and injured in mines using the **caving** *system of mining during the calendar years 1914, 1915, and 1916.*

Cause.	Killed.			Injured.		
	1914	1915	1916	1914	1915	1916
Falls of rock	42	34	34	2,045	1,879	1,962
Run of ore in stope, chute, or bin	2	4	3	598	486	889
Explosives	7	8	13	79	66	173
Haulage	9	2	8	781	794	978
Falls of persons	6	8	7	143	142	124
Miscellaneous	12	7	2	2,450	2,267	2,795
Shaft	25	4	13	200	167	213
Total	103	67	80	6,296	5,801	7,134
Per 1,000 300-day workers	5.41	3.79	3.92	330.44	328.13	349.71

OPEN-PIT MINING WITH STEAM SHOVEL.

The returns from mines that use the open-pit method of mining with steam shovels represent 23 operating companies, employing 9,100 men (surface shops excluded). Of the 23 companies, 15 in Minnesota and 3 in Alabama are iron-mine operators, and 1 each in Nevada, New Mexico, and Utah operates a copper mine. The accompanying table shows fatalities and injuries by principal causes from 1914 to 1916, inclusive, together with the fatality and injury rates per 1,000 300-day workers.

Number killed and injured in **open pit** *mines where the ore is mined by steam shovel during the calendar years 1914, 1915, and 1916.*

Cause.	Killed.			Injured.		
	1914	1915	1916	1914	1915	1916
Falls of rock	5	4	5	425	449	402
Run of ore in stope, chute, or bin					8	9
Explosives	8	1	7	107	38	41
Haulage	8	16	11	271	194	287
Falls of persons				238	179	129
Miscellaneous	3	3	4	1,256	1,040	1,548
Shaft						
Total	24	24	27	2,297	1,908	2,416
Per 1,000 300-day workers	2.73	3.16	3.15	261.00	250.79	281.58

OPEN-PIT MINING WITHOUT STEAM SHOVEL.

Although the returns indicate that the open-pit mining without steam shovels is probably safer than any other system, being comparable to quarry work, yet the number of men employed is not large enough to permit the drawing of a definite conclusion. Open-pit mines necessarily have plenty of light, so that the miner can see any dangerous conditions.

Number killed and injured in **open-pit** *mines where no steam shovels are used during the calendar years 1914, 1915, and 1916.*

Cause.	Killed.			Injured.		
	1914	1915	1916	1914	1915	1916
Falls of rock	4	1		59	16	26
Run of ore in stope, chute, or bin				3	1	3
Explosives				5	1	5
Haulage	1			28	22	34
Falls of persons		1		11	9	2
Miscellaneous		1		64	93	38
Total	5	3		170	142	108
Per 1,000 300-day workers	2.98	2.54		101.49	120.03	348.39

TABLE 20.—*METAL-MINE ACCIDENTS in 1916*,

NUMBER KILLED.

Method of mining.	Underground.									
	Fall of rock or ore from roof or wall.	Rock or ore while loading at working face.	Timber or hand tools.	Explosives.	Haulage accidents.	Falling down chute, winze, raise, or stope.	Run of ore from chute or pocket.	Drilling accidents.	Electricity.	Machinery (not including locomotives or drills).
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Room and pillar	21			9	7	2				
Overhand stoping:										
(a) *With stulls*	*4*	*2*		*1*	*1*	*2*			*2*	*1*
(b) *With square sets, cribs, etc*	*25*	*1*		*3*	*3*	*2*			*1*	
(c) *With filling*	*13*	*2*	*1*	*2*	*2*	*1*			*1*	
(d) *Shrinkage*	*9*			*4*						
Underhand stoping	3			3	2	1	1		1	
Caving methods	34	1		13	8	7	2		1	
Open pit, with steam shovel										
Open pit, without steam shovel										
Total, 1916	**109**	**6**	**1**	**35**	**23**	**15**	**3**		**6**	**1**
Total, 1915	147	6	5	32	12	30	9		10	
Total, 1914	141	4	2	32	25	33	2	1	6	1

NUMBER INJURED.

Method of mining.	1	2	3	4	5	6	7	8	9	10
Room and pillar	591	882	148	58	793	68	116	259	26	35
Overhand stoping:										
(a) *With stulls*	*430*	*274*	*149*	*20*	*186*	*66*	*16*	*196*	*9*	*22*
(b) *With square sets, cribs, etc*	*2,191*	*1,361*	*749*	*142*	*985*	*166*	*141*	*420*	*7*	*21*
(c) *With filling*	*668*	*427*	*272*	*22*	*300*	*100*	*119*	*153*	*6*	*16*
(d) *Shrinkage*	*142*	*320*	*79*	*20*	*133*	*22*	*59*	*90*	*3*	*6*
Underhand stoping	95	524	111	217	365	24		152	2	21
Caving methods	1,962	597	1,160	173	978	124	292	378	31	29
Open pit, with steam shovel										
Open pit, without steam shovel										
Total, 1916	**6,079**	**4,385**	**2,668**	**652**	**3,740**	**570**	**743**	**1,618**	**84**	**150**
Total, 1915	5,912	3,788	2,965	262	3,323	696	614	1,851	66	427
Total, 1914	5,570	3,251	2,579	274	3,043	753	593	1,330	43	161

by causes, grouped by mining methods.

NUMBER KILLED.

Underground—Continued.						Shaft.						
Mine fires.	Suffocation from natural gases.	Inrush of water.	Stepping on nail.	Other causes.	**Total, underground.**	Falling down shafts.	Objects falling down shafts.	Breaking of cables.	Overwinding.	Skip or cage.	Other causes.	**Total, shaft.**
11	**12**	**13**	**14**	**15**		**16**	**17**	**18**	**19**	**20**	**21**	
......	......	......	......	2	**41**	3	1	......	......	2	......	**6**
......	*1*	......	......	......	*14*	*3*	......	......	......	*3*	*1*	*7*
4	......	......	......	*3*	*42*	*4*	*2*	......	......	*6*	*1*	*13*
......	......	......	......	*2*	*24*	*5*	*1*	......	......	*4*	*1*	*11*
......	......	......	......	......	*13*	*1*	......	......	......	......	......	*1*
......	......	......	......	......	**11**	......	1	......	......	......	......	**1**
......	......	......	......	1	**67**	5	5	......	......	3	......	**13**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
4	**1**	......	......	**8**	**212**	**21**	**10**	......	......	**18**	**3**	**52**
......	1	......	1	3	**256**	12	8	2	1	12	6	**41**
2	......	8	......	4	**261**	22	7	......	......	33	9	**71**

NUMBER INJURED.

14	2	......	104	685	**3,781**	5	73	1	......	73	80	**232**
......	......	......	*51*	*352*	*1,771*	*1*	*3*	......	......	*28*	*21*	*53*
2	*2*	......	*67*	*1,203*	*7,457*	*17*	*62*	*2*	......	*37*	*86*	*204*
......	......	......	*61*	*372*	*2,516*	*17*	*29*	......	......	*13*	*9*	*68*
......	*1*	......	*12*	*204*	*1,091*	*5*	*7*	*1*	......	*9*	*16*	*38*
......	......	......	9	164	**1,684**	......	7	......	......	4	12	**23**
......	17	2	149	1,029	**6,921**	18	57	......	1	76	61	**213**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
16	**22**	**2**	**453**	**4,009**	**25,221**	**63**	**238**	**4**	**1**	**240**	**285**	**831**
40	71	28	622	3,945	**24,610**	31	235	3	1	185	199	**654**
6	15	12	215	3,423	**21,268**	34	149	3	2	218	165	**571**

TABLE 20.—***METAL-MINE ACCIDENTS*** *in 1916, by*

NUMBER KILLED.

Method of mining.	**Surface.**									
	Mine cars, mine locomotives, or aerial trams.	Railway cars and locomotives.	Run or fall of ore in or from ore bins.	Falls of persons.	Stepping on nail.	Hand tools, axes, bars, etc.	Electricity.	Machinery.	Other causes.	**Total, surface.**
	22	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	
Room and pillar	......	......	......	......	......	......	......	......	......	......
Overhand stoping:										
(a) *With stulls*	......	......	......	......	......	......	......	......	......	......
(b) *With square sets, cribs, etc*	......	......	......	......	......	......	......	......	......	......
(c) *With filling*	......	......	......	......	......	......	......	......	......	......
(d) *Shrinkage*	......	......	......	......	......	......	......	......	......	......
Underhand stoping	......	......	......	......	......	......	......	......	......	......
Caving methods	......	......	......	......	......	......	......	......	......	......
Open pit, with steam shovel	......	......	......	......	......	......	......	......	......	......
Open pit, without steam shovel	......	......	......	......	......	......	......	......	......	......
Total, 1916	......	......	......	......	......	......	......	......	......	......
Total, 1915	......	......	......	......	......	......	......	......	......	......
Total, 1914	......	......	......	......	......	......	......	......	......	......

NUMBER INJURED.

Method of mining.	22	23	24	25	26	27	28	29	30	**Total, surface.**
Room and pillar	......	......	......	......	......	......	......	......	......	......
Overhand stoping:										
(a) *With stulls*	......	......	......	......	......	......	......	......	......	......
(b) *With square sets, cribs, etc*	......	......	......	......	......	......	......	......	......	......
(c) *With filling*	......	......	......	......	......	......	......	......	......	......
(d) *Shrinkage*	......	......	......	......	......	......	......	......	......	......
Underhand stoping	......	......	......	......	......	......	......	......	......	......
Caving methods	......	......	......	......	......	......	......	......	......	......
Open pit, with steam shovel	......	......	......	......	......	......	......	......	......	......
Open pit, without steam shovel	......	......	......	......	......	......	......	......	......	......
Total, 1916	......	......	......	......	......	......	......	......	......	......
Total, 1915	......	......	......	......	......	......	......	......	......	......
Total, 1914	......	......	......	......	......	......	......	......	......	......

causes, grouped by mining methods—Continued.

NUMBER KILLED.

Open pit.												Grand total.		
Falls or slides of rock or ore.	Explosives.	Haulage accidents (locomotives, etc.).	Steam shovels.	Falls of persons.	Falls of derricks, booms, etc.	Run or fall of ore in or from ore bins.	Machinery (other than locomotives or steam shovels).	Electricity.	Hand tools.	Other causes.	**Total, open pit.**			
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**		**1916**	**1915**	**1914**
......	......	......	......	......	......	......	......	......	......	......	......	**47**	27	48
......	......	......	......	......	......	......	......	......	......	......	......	**21**	*10*	*181*
......	......	......	......	......	......	......	......	......	......	......	......	**55**	*47*	
......	......	......	......	......	......	......	......	......	......	......	......	**35**	*99*	
......	......	......	......	......	......	......	......	......	......	......	......	**14**	*36*	
......	......	......	......	......	......	......	......	......	......	......	......	**12**	11	
......	......	......	......	......	......	......	......	......	......	......	......	**80**	67	103
5	7	11	......	......	......	......	......	1	......	3	**27**	**27**	24	24
......	......	......	......	......	......	......	......	......	......	......	......	**0**	3	5
5	**7**	**11**	......	......	......	......	......	**1**	......	**3**	**27**	**291**	......	......
5	1	16	1	1	1	......	......	......	......	2	**27**	......	324	......
9	8	9	1	......	......	......	2	......	......	......	**29**	......	......	361

NUMBER INJURED.

31	32	33	34	35	36	37	38	39	40	41	Total, open pit.	1916	1915	1914
......	......	......	......	......	......	......	......	......	......	......	......	**4,013**	2,819	3,171
......	......	......	......	......	......	......	......	......	......	......	......	**1,824**	*1,290*	*12,372*
......	......	......	......	......	......	......	......	......	......	......	......	**7,661**	*4,480*	
......	......	......	......	......	......	......	......	......	......	......	......	**2,584**	*7,654*	
......	......	......	......	......	......	......	......	......	......	......	......	**1,129**	*2,244*	
......	......	......	......	......	......	......	......	......	......	......	......	**1,707**	976	
......	......	......	......	......	......	......	......	......	......	......	......	**7,134**	5,801	6,296
402	41	287	167	129	3	9	48	6	182	1,142	**2,416**	**2,416**	1,908	2,297
26	5	34	2	2	......	3	4	......	5	27	**108**	**108**	142	170
428	**46**	**321**	**169**	**131**	**3**	**12**	**52**	**6**	**187**	**1,169**	2,524	**28,576**	......	......
465	39	216	85	188	9	9	67	3	188	781	2,050	......	27,314	......
484	112	299	146	249	4	3	79	4	258	829	**2,467**	......	......	24,306

FATALITIES AT PLACER MINES.

Tables 21 and 22 contain the combined reports of 864 operators of placer mines, including dredges, hydraulic mines, and underground gravel mines. At these mines 8,354 men were employed and 9 men were killed in 1916, the fatality rate being 1.08 per 1,000 men employed, as compared with 3.11 in 1915; 2.30 for 1914, 2.25 for 1913, and 2.43 for 1912. The average length of time these mines worked during the year was 208 days. The placer mines of Alaska worked approximately 180 days, and all other placers 247 days.

Only the more serious injuries at Alaska placer mines were included in the Territorial mine inspector's report, hence the details of nonfatal injuries recorded here are incomplete, being based on reports received from only a small number of operators.

TABLE 21.—***PLACER MINES:*** *Fatalities and injuries, by causes, during the years ended Dec. 31, 1912 to 1916, inclusive.*

Year.	Dredging.							Hydraulicking.									Underground.										Grand total.
	Machinery.	Electricity.	Boiler explosions or bursting steam pipes.	Falls of persons.	Tools.	Other causes.	Total.	Cave of bank.	Explosives.	Hydraulic giants.	Falls of persons.	Rock while handling.	Tools.	Machinery, derricks, etc.	Other causes.	Total.	Fall of roof or gravel.	Timber or hand tools.	Explosives.	Falls of persons.	Haulage.	Drilling.	Hoisting.	Steam (when steam points are used).	Other causes.	Total.	
	1	2	3	4	5	6		7	8	9	10	11	12	13	14		15	16	17	18	19	20	21	22	23		
Killed:																											
1912 [a]	2	....	....	....	....	2	4	2	1	1	....	....	....	....	....	4	....	....	....	....	....	....	....	....	....	....	8
1913	3	2	....	....	....	2	7	....	....	....	....	....	....	1	....	1	5	1	....	1	....	....	....	....	....	7	15
1914	....	2	....	2	....	1	5	....	1	....	....	....	....	....	1	2	2	....	1	1	....	....	2	....	2	8	15
1915	2	2	....	1	....	1	6	2	4	....	....	1	....	....	....	7	2	....	1	2	....	....	1	....	....	6	19
1916	**1**	....	....	**1**	....	....	**2**	....	....	....	....	....	....	**1**	....	**1**	**2**	....	....	**1**	....	....	**1**	....	**2**	**6**	**9**
Total	8	6	....	4	....	6	24	4	6	1	....	1	....	2	1	15	11	1	2	5	....	....	4	....	4	27	66
Injured:																											
1912 [a]	17	....	1	8	27	18	71	3	....	2	5	7	4	1	4	26	5	3	1	....	1	1	1	....	....	12	109
1913	35	1	....	18	25	55	134	5	1	....	3	7	1	2	1	20	9	3	....	1	....	1	1	....	2	17	171
1914	88	2	....	20	79	37	226	4	1	2	5	4	3	6	6	31	9	4	1	2	....	2	....	....	....	18	275
1915	80	5	....	44	60	179	368	3	4	....	9	6	3	2	1	28	6	5	2	....	2	....	....	....	2	17	413
1916	**127**	**2**	....	**61**	**106**	**215**	**511**	**3**	....	**1**	**5**	**4**	....	**4**	**2**	**19**	**10**	**5**	**6**	**4**	**3**	**3**	**1**	**1**	**18**	**51**	**581**
Total	347	10	1	151	297	504	1,310	18	6	5	27	28	11	15	14	124	39	20	10	7	6	7	3	1	22	115	1,549

[a] Does not include Alaska.

TALBE 22.—*PLACER MINES: Men employed, number killed, by causes, and days worked, during the year ended Dec. 31, 1916.*

State.	Number of active operators.		Men employed.	Days work performed.	Average number of days worked.	Number of men killed.																										
						Dredging.							Hydraulicking.									Underground.										
	1,000 or more days' labor.	Less than 1,000 days' labor.				Machinery. 1	Electricity. 2	Boiler explosions or bursting steam pipes. 3	Falls of persons. 4	Tools. 5	Other causes. 6	**Total.**	Cave of bank. 7	Explosives. 8	Hydraulic giants. 9	Falls of persons. 10	Rock while handling. 11	Tools. 12	Machinery, derricks, etc. 13	Other causes. 14	**Total.**	Fall of roof or gravel. 15	Timber or hand tools. 16	Explosives. 17	Falls of persons. 18	Haulage. 19	Drilling. 20	Hoisting. 21	Steam (when steam points are used.) 22	Other causes. 23	**Total.**	**Grand total.**
Alaska	280	108	4,924	886,320	180	....	....	....	1	....	....	1	....	....	....	....	....	....	1	....	1	2	....	....	1	....	....	1	....	1	5	7
California	48	177	2,212	605,582	274	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	2
Colorado	15	....	123	36,900	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Idaho	12	63	313	47,713	152	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Montana	4	46	231	47,461	205	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Nevada	5	13	150	42,174	281	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
New Mexico	1	4	31	4,600	135	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Oregon	10	59	305	55,021	180	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Other States	3	16	62	8,757	141	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Total, 1916	**378**	**486**	**8,354**	**1,734,528**	**208**	**1**	....	....	**1**	....	....	**2**	....	....	....	....	....	....	**1**	....	**1**	**2**	....	....	**1**	....	....	**1**	....	**2**	**6**	**9**
Total, 1915	**310**	**499**	**6,100**	**1,283,021**	**210**	**2**	**2**	....	**1**	....	**1**	**6**	**2**	**4**	....	....	**1**	....	....	....	**7**	**2**	....	**1**	**2**	....	....	**1**	....	....	**6**	**19**
Total, 1914	300	443	6,521	1,329,104	204	....	2	....	2	....	1	5	....	1	....	....	....	....	....	1	2	2	....	1	1	....	....	2	....	2	8	15
Total, 1913	321	424	6,680	1,329,033	199	3	2	....	....	....	2	7	....	....	....	....	....	....	1	....	1	5	1	....	1	....	....	....	....	....	7	15
Total, 1912 [a]	116	343	3,289	849,091	258	2	....	....	....	....	2	4	2	1	1	....	....	....	....	....	4	....	....	....	....	....	....	....	....	....	....	8

[a] Does not include Alaska.

METAL-MINE, COAL-MINE, AND QUARRY ACCIDENTS COMPARED.

Comparative data for accidents at metal mines, coal mines, and quarries of the United States are shown in Tables 23 and 24. The majority of the coal-mining States have long had systematic coal-mine inspection, whereas a number of the metal-mining States either have no inspection service or have started one recently.

Because of the great disasters that have happened in coal mines and the prominence given these by the press, coal mining is usually considered much more hazardous than metal mining. The latter, as the figures show, does not claim its death toll in disasters that involve many men, most of the men who die from accidents being killed one at a time.

TABLE 23.—*Fatality rates in different branches of mineral industries in 1916 compared on a 300-day basis.*

[Length of shift not considered.]

Branch of mineral industry.	Average days active.	Men employed.		Days of labor performed.	Killed.	Number killed per 1,000 employed.	
		Actual number.	Equivalent in 300-day workers (calculated).			On actual-time basis.	On 300-day basis.
Metal mines	**282**	**204,685**	**192,455**	**57,736,425**	**697**	**3.41**	**3.62**
Metallurgical works:							
Ore-dressing plants	315	22,365	23,470	7,041,083	33	1.48	1.41
Smelters [a]	338	43,829	49,363	14,809,046	36	.82	.73
Auxiliary works	338	14,007	15,763	4,729,010	14	1.00	.89
Coal mines	235	720,971	565,766	169,729,816	2,226	3.09	3.93
Coke ovens:							
Beehive	300	18,570	18,591	5,577,341	24	1.29	1.29
By-product	357	13,033	15,528	4,658,333	21	1.61	1.35
Quarries (inside)	242	60,944	49,077	14,723,204	114	1.87	2.32
Quarries (outside)	275	29,853	27,380	8,213,974	59	1.98	2.15
Total, 1916	**255**	**1,128,257**	**957,393**	**287,218,232**	**3,224**	**2.86**	**3.37**
Total 1915	231	1,067,817	822,826	246,847,880	3,076	2.88	3.74

[a] Does not include iron and steel industry.

TABLE 24.—*METAL MINES, COAL MINES, AND QUARRIES: Principal causes of fatalities, showing percentage due to each cause, 1911 to 1916, by years.*

Industry.	Cause of death.								Total.
	Falls of overburden, roof, quarry material, ore, or coal.	Explosives.	Haulage and handling rock, ore, or coal.	Falls of person.	Electricity.	Machinery.	Gas and dust explosions.	Other causes.	
1911:									
Metal mines	**32.52**	**11.22**	**7.63**	**15.39**	**2.45**	**3.16**	....	**27.63**	**100.00**
Coal mines	47.40	6.02	17.13	1.28	3.73	1.51	13.74	9.19	100.00
Quarries	25.53	26.60	20.21	8.51	1.07	9.04	....	9.04	100.00
1912:									
Metal mines	**34.49**	**14.22**	**10.28**	**13.92**	**3.78**	**3.78**	....	**19.52**	**100.00**
Coal mines	49.03	6.08	19.14	1.36	3.64	1.65	11.99	7.11	100.00
Quarries	17.37	22.06	27.70	8.92	1.87	11.74	....	10.33	100.00
1913:									
Metal mines	**34.70**	**13.03**	**12.88**	**12.30**	**3.81**	**4.39**	....	**18.89**	**100.00**
Coal mines	45.39	4.95	18.31	1.80	3.16	1.80	18.45	6.14	100.00
Quarries	14.75	24.04	23.50	9.29	2.73	12.57	....	13.12	100.00
1914:									
Metal mines	**36.32**	**10.73**	**10.20**	**16.10**	**3.04**	**2.50**	....	**21.11**	**100.00**
Coal mines	46.09	5.95	18.79	2.85	4.07	1.87	14.22	6.16	100.00
Quarries	29.45	19.44	18.33	12.78	1.67	6.11	....	12.22	100.00
1915:									
Metal mines	**36.71**	**14.10**	**10.49**	**15.91**	**2.53**	**1.99**	....	**18.26**	**100.00**
Coal mines	47.55	6.83	18.64	1.37	4.36	1.68	13.40	6.17	100.00
Quarries	30.40	18.92	15.55	11.48	2.03	9.46	....	12.16	100.00
1916:									
Metal mines	**32.28**	**12.77**	**10.04**	**14.64**	**3.73**	**2.58**	....	**23.96**	**100.00**
Coal mines	47.84	6.56	20.89	1.39	4.36	1.89	10.15	6.92	100.00
Quarries	19.08	16.18	19.66	8.09	4.05	16.76	....	16.18	100.00

Although the fatality rate in metal mines during 1916 was 3.41 per 1,000 men employed, and in coal mines 3.09, yet the comparison is not fair, for the reason that the metal miners worked 282 days as compared with 235 days for the coal miners. Thus the men in the metal mines were exposed to the mining risk 47 days longer than were the coal miners. If both rates be reduced to the 300-day basis, the metal-mine fatality rate becomes 3.62 per 1,000 300-day workers in comparison with 3.93 for the coal mines and 2.32 for quarries.

Percentages of men killed by various causes, also the number employed and the number killed, in metal mines, coal mines, and quarries in the United States are shown in Tables 23 and 24.

TABLE 25.—*ALL MINES:* *Men employed during the years ended Dec. 31, 1911 to 1916, by States.*

State.	1911	1912	1913	1914	1915	1916
Alabama	4,101	4,827	5,212	5,225	4,956	7,360
Alaska	....	1,914	8,000	8,000	8,125	8,193
Arizona	12,768	15,591	16,489	14,011	14,057	21,421
Arkansas	584	404	337	78	685	1,012
California	10,877	10,312	11,476	9,761	10,414	13,295
Colorado	10,404	8,892	15,949	9,228	6,369	10,120
Connecticut	164	259	255	216	108	110
Florida	4,305	4,461	4,538	2,885	1,737	1,974
Georgia	1,001	515	444	305	295	604
Idaho	4,801	6,229	5,769	5,249	5,190	6,083
Illinois	848	440	511	490	384	509
Iowa	244	200	231	281	214	271
Kansas	729	831	608	315	435	615
Kentucky	461	460	516	221	174	278
Maine	81	72	121	128	105	60
Maryland	231	329	359	69	223	143
Massachusetts	118	58	48	31	86	34
Michigan	31,584	29,469	28,174	27,272	27,512	34,061
Minnesota	16,548	16,559	19,546	17,694	14,572	19,152
Missouri	9,901	11,403	9,747	8,480	9,570	14,334
Montana	13,346	13,340	19,500	13,046	13,846	19,491
Nevada	6,210	7,547	7,316	6,821	5,713	7,953
New Hampshire	100	90	83	38	41	34
New Jersey	1,739	1,633	1,433	1,362	1,745	2,031
New Mexico	2,450	2,502	3,766	2,424	2,732	4,182
New York	3,202	2,710	3,345	3,002	2,558	3,662
North Carolina	997	1,068	1,167	994	627	695
Ohio	362	310	305	192	265	262
Oklahoma	418	541	641	596	855	1,593
Oregon	1,394	1,052	1,349	1,279	1,070	1,308
Pennsylvania	862	762	656	425	384	460
South Carolina	984	1,041	444	416	487	153
South Dakota	2,519	1,963	2,091	1,841	1,796	2,491
Tennessee	4,454	3,480	3,151	3,253	2,821	3,836
Texas	248	386	350	346	294	943
Utah	7,710	8,458	7,872	5,837	5,449	7,384
Vermont	180	181	143	112	98	155
Virginia	3,971	2,516	2,596	1,877	1,976	2,919
Washington	1,569	1,307	1,302	865	715	1,239
Wisconsin	2,844	3,834	4,330	2,576	2,651	3,574
Wyoming	612	662	616	480	386	501
Other States	58	591	490	394	398	190
Total, metal mines	**165,979**	**169,199**	**191,276**	**158,115**	**152,118**	**204,685**

TABLE 26.—*ALL MINES:* *Total number of injuries, by causes, during the years ended Dec. 31, 1911 to 1915 and 1916.*

Cause.	Number injured.			
	1911 to 1915, inclusive.[a]	Percentage.	1916	
			Total.	Percentage.
Underground:				
1. Fall of rock or ore from roof or wall	33,681	21.62	9,535	19.77
2. Rock or ore while loading at working face or chute.	13,747	8.82	5,951	12.34
3. Timber or hand tools	14,654	9.41	4,195	8.70
4. Explosives	1,832	1.18	810	1.68
5. Haulage system (mine cars, mine locomotives, breakage of rope, etc.)	17,710	11.37	5,226	10.83
6. Falling down chute, winze, raise, or stope	4,466	2.87	1,060	2.20
7. Run of ore from chute or pocket	4,471	2.87	1,018	2.11
8. Drilling accidents (by machine or hand drills)	8,155	5.23	2,253	4.67
9. Electricity	252	.16	89	.18
10. Machinery (other than locomotives or drills)	2,293	1.47	332	.69
11. Mine fires	96	.06	21	.04
12. Suffocation from natural gases	178	.11	38	.08
13. Inrush of water	87	.06	4	.01
14. Nails, splinters, etc	1,479	.95	750	1.55
15. Other causes	17,712	11.37	5,922	12.28
Total number injured underground	**120,813**	**77.55**	**37,204**	**77.13**

[a] Fay, A. H., Metal-mine accidents in the United States during the calendar year 1915. Tech. Paper 168, Bu. Mines. Detailed figures by years, 1911 to 1915, given on page 84.

TABLE 26.—*ALL MINES: Total number of injuries, by causes, during the years ended Dec. 31, 1911 to 1915 and 1916*—Continued.

Cause.	Number injured.			
	1911 to 1915, inclusive.	Percentage.	1916	
			Total.	Percentage.
Shaft:				
16. Falling down shafts	408	.26	132	.27
17. Objects falling down shafts	1,236	.80	347	.72
18. Breaking of cables	36	.02	5	.01
19. Overwinding	44	.03	7	.01
20. Skip, cage, or bucket	983	.63	360	.75
21. Other causes	969	.62	394	.82
Total number injured by shaft accidents	**3,676**	**2.36**	**1,245**	**2.58**
Surface (at surface yards and shops):				
22. Mine cars or mine locomotives, gravity or aerial trams	996	.64	476	.99
23 Railway cars and locomotives	445	.29	176	.36
24. Run or fall of ore in or from ore bins	487	.31	125	.26
25. Falls of persons	1,568	1.01	658	1.36
26. Nails, splinters, etc	661	.42	448	.93
27. Hand tools, axes, bars, etc	2,344	1.50	823	1.71
28. Electricity	149	.10	58	.12
29. Machinery	1,999	1.28	602	1.25
30 Other causes	5,957	3.82	2,894	6.00
Total number injured by surface accidents	**14,606**	**9.37**	**6,260**	**12.98**
Open pit:				
31. Falls or slides of rock or ore	2,996	1.92	541	1.12
32. Explosives	703	.45	60	.13
33. Haulage system (cars, locomotives, etc.)	1,915	1.23	377	.78
34. Steam shovels	1,152	.74	186	.39
35. Falls of persons	1,650	1.06	247	.51
36. Falls of derricks, booms, etc	193	.12	5	.01
37. Run or fall of ore in or from ore bins	73	.05	20	.04
38. Machinery (other than locomotives or steam shovels)	1,083	.69	208	.43
39. Electricity	57	.04	12	.02
40. Hand tools	1,589	1.02	347	.72
41. Other causes	5,287	3.40	1,525	3.16
Total number injured by open-pit accidents.	**16.698**	**10.72**	**3,528**	**7.31**
Grand total	**155,793**	**100.00**	**48,237**	**100.00**

MINING FATALITIES DUE TO EXPLOSIVES.

The accompanying table shows the number of fatalities due to the use of explosives in mining. From 11 to 14 per cent of the metal-mine fatalities and 16 to 26 per cent of the quarry fatalities are due to explosives, while about 6 per cent of the fatalities at coal mines are due to explosives.

Number and percentage of fatalities, due to explosives, at mines and quarries in the United States.

Year.	Metal mines.		Quarries.		Coal mines.	
	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.
1911	78	11.22	50	26.60	160	6.02
1912	94	14.22	47	22.06	147	6.08
1913	89	13.03	44	24.04	138	4.95
1914	60	10.73	35	19.44	146	5.95
1915	78	14.10	28	18.92	155	6.83
1916	89	12.77	28	16.18	146	6.56

PRODUCTION AND DISTRIBUTION OF EXPLOSIVES, 1916.[a]

The total production, excluding exports, of explosives in the United States during the calendar year 1916, according to figures that the Bureau of Mines received from manufacturers, was 505,415,052 pounds (252,708 short tons), as compared with 460,900,796 pounds (230,450 short tons) in 1915.

The production for 1916 is segregated as follows: Black powder, 215,575,025 pounds; "high" explosives other than permissible explosives, 255,154,787 pounds; and permissible explosives, 34,685,240 pounds. These figures represent an increase of 17,852,725 pounds of black powder, 19,326,200 pounds of high explosives, and 7,335,331 pounds of permissible explosives, as compared with figures for 1915.

The accompanying table shows the percentage of black powder, high explosives, and permissibles used in the various branches of the mining industry. For example, in 1916, 82.1 per cent of the black powder was used in mining coal and only 3.6 per cent for other mining. In 1916, 73.2 per cent of the explosives produced were used in the mining industry of the United States, as compared with 72 per cent in 1915. Of the permissibles, 76.6 per cent in 1916 were used in coal mining and 17.9 per cent for other mining. Of high explosives only a small percentage is used for mining coal, and approximately 50 per cent is used for other mining.

TABLE 27.—*Percentage of explosives used for various purposes in the United States during 1915 and 1916.*

	Coal mining.	Other mining.	Railway and other construction work.	All other purposes.	Total.
1916.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Black powder	82.1	3.6	5.0	9.3	100.0
High explosives	8.2	51.6	8.6	31.6	100.0
Permissibles	76.6	17.9	.3	5.2	100.0
Total	**44.4**	**28.8**	**6.5**	**20.3**	**100.0**
1915.					
Black powder	84.8	3.4	3.6	8.2	100.0
High explosives	9.5	46.3	9.4	34.9	100.1
Permissibles	79.9	17.1	.5	2.5	100.0
Total	**45.9**	**26.1**	**6.4**	**21.5**	**99.9**

ACCIDENTS AT METALLURGICAL PLANTS DURING 1916.[b]

Table 28 shows the number of men employed, number killed and injured at ore-dressing plants, smelting plants, and auxiliary works, by States, for the calendar year 1916. Table 29 shows the fatalities and injuries by causes and the percentage of accidents due to each cause. The fatality rate at ore-dressing plants for 1916 was 1.41 per 1,000 300-day workers, while at smelting plants the fatality rate was 0.73 per 1,000 300-day workers. The nonfatal injuries at ore-dressing plants were 135.66 per 1,000 300-day workers and at smelting plants 195.61 per 1,000 300-day workers.

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[a] Fay, A. H. Production of explosives in the United States, 1916, Tech. Paper 175, Bureau of Mines, 1917, 24 pp.

[b] Fay, A. H. Accidents at metallurgical plants, 1916, Tech. Paper 201, Bureau of Mines, 1918, 20 pp.

TABLE 28.—*Labor and accident statistics of metallurgical works for the calendar year 1916.*

State.	Ore-dressing plants.[a]			Smelting plants.[b]			Auxiliary works.[c]		
	Men employed.	Killed.	Injured.	Men employed.	Killed.	Injured.	Men employed.	Killed.	Injured.
Alabama	92	....	9	....	....	....	....	....	....
Alaska	925	....	127	....	....	....	....	....	....
Arizona	2,380	3	524	3,470	1	1,112	2,512	4	385
Arkansas	173	....	20	410	....	154	10	....	....
California	794	....	118	1,146	1	224	280	....	56
Colorado	1,382	4	176	3,099	1	508	....	....	....
Georgia	68	....	9	....	....	....	17	....	....
Idaho	611	....	75	....	....	....	88	....	2
Illinois	58	....	4	4,735	2	1,356	1,325	....	300
Kansas	80	....	7	3,611	3	695	16	....	9
Maryland	9	....	1	1,300	1	605	8	....	....
Michigan	2,255	2	137	1,001	1	251	77	....	1
Minnesota	286	....	48	....	....	....	....	....	....
Missouri	1,375	1	186	1,532	2	317	815	....	103
Montana	2,153	3	168	3,200	3	333	3,027	6	307
Nevada	1,556	1	133	870	....	90	70	....	3
New Jersey	715	3	45	4,870	6	646	148	....	14
New Mexico	1,346	4	310	48	....	....	14	....	....
New York	567	4	73	570	1	361	50	....	2
North Carolina	55	....	3	....	....	....	....	....	....
Oklahoma	94	....	15	5,181	1	817	1,381	....	187
Oregon	77	....	2	22	....	....	33	....	....
Pennsylvania	25	....	1	2,583	3	610	1,398	2	168
South Dakota	362	....	51	16	....	1	....	....	....
Tennessee	460	1	48	200	1	241	123	....	136
Texas	60	....	7	963	....	179	215	1	102
Utah	3,017	5	711	2,401	8	622	857	....	231
Vermont	137	....	8	8	....	2	....	....	....
Virginia	475	1	43	251	....	39	418	1	11
Washington	17	....	....	1,045	1	135	642	....	121
West Virginia	....	....	....	932	....	148	375	....	94
Wisconsin	421	....	90	5	....	1	85	....	8
Other States	340	1	35	360	....	209	23	....	....
Total	22,365	33	3,184	43,829	36	9,656	14,007	14	2,240
Total 300-day workers	23,470	....	....	49,363	....	....	15,763	....	....
Fatality and injury rates[d]	....	1.41	135.66	....	.73	195.61	....	.89	142.10

[a] Stamp mills, sampling works, slime plants, lixiviation, leaching, cyanide, and flotation mills.
[b] Blast, reverberatory, and roasting furnaces; convertors, casting department, and refineries.
[c] Yards, shops, construction, etc.
[d] Calculated on basis of 300-day workers.

TABLE 29.—*Accidents, by causes, at metallurgical works during the calendar year 1916.*

Cause of accident.	Killed.			Injured.		
	Number.	Per cent of group total.	Per cent of grand total.	Number.	Per cent of group total.	Per cent of grand total.
ORE-DRESSING PLANT.						
1. Haulage system	3	9.09	3.62	146	4.59	0.97
2. Railway cars and locomotives	4	12.12	4.82	42	1.32	.28
3. Crushers, rolls, or stamps	....	....	....	168	5.28	1.11
4. Tables, jigs, etc	....	....	....	82	2.57	.54
5. Other machinery	11	33.34	13.25	336	10.55	2.23
6. Falls of persons	2	6.06	2.41	373	11.71	2.47
7. Suffocation in ore bins	3	9.09	3.62	4	.13	.03
8. Falling objects (rocks, timbers, etc.)	1	3.03	1.20	363	11.40	2.41
9. Cyanide or other poisoning	....	....	....	13	.41	.09
10. Scalding (steam or water)	2	6.06	2.41	35	1.10	.23
11. Electricity	2	6.06	2.41	53	1.66	.35
12. Hand tools, axes, bars, etc	1	3.03	1.20	360	11.31	2.39
13. Nails, splinters, etc	....	....	....	171	5.37	1.13
14. Flying pieces of rock from sledging or crushing	....	....	....	109	3.42	.72
15. Other causes	4	12.12	4.82	929	29.18	6.16
Total	33	100.00	39.76	3,184	100.00	21.11
SMELTING PLANTS.						
16. Haulage system	4	11.11	4.82	814	8.43	5.40
17. Railway cars and locomotives	2	5.55	2.41	117	1.21	.77
18. Cranes	5	13.89	6.03	130	1.35	.86
19. Other machinery	3	8.33	3.62	385	3.99	2.55
20. Falls of persons	9	25.00	10.85	757	7.84	5.02
21. Suffocation in ore bins	1	2.78	1.20	1	.01	.01
22. Flying or falling objects (rocks, timbers, etc.)	4	11.11	4.82	1,438	14.89	9.54
23. Gas (burns or asphyxiation)	1	2.78	1.20	112	1.16	.74
24. Scalding (steam or water)	1	2.78	1.20	132	1.37	.88
25. Electricity	1	2.78	1.20	36	.37	.24
26. Hand tools, axes, bars, etc	....	....	....	875	9.06	5.80
27. Nails, splinters, etc	....	....	....	252	2.61	1.67
28. Burns from matte, slag, or molten metal (pouring or spilling)	1	2.78	1.20	2,163	22.40	14.34
29. Hot-metal explosions	3	8.33	3.62	217	2.25	1.44
30. Other causes	1	2.78	1.20	2,227	23.06	14.77
Total	36	100.00	43.37	9,656	100.00	64.03
AUXILIARY WORKS.						
31. Haulage systems, cars, motors, etc	1	7.14	1.20	128	5.71	.85
32. Railway cars and locomotives	1	7.14	1.20	66	2.95	.44
33. Falls of persons	5	35.72	6.03	258	11.52	1.71
34. Falling objects (rocks, timbers, etc.)	2	14.29	2.41	397	17.72	2.63
35. Nails, splinters, etc	....	....	....	149	6.65	.99
36. Hand tools, axes, bars, etc	....	....	....	333	14.87	2.21
37. Electricity	2	14.29	2.41	27	1.20	.18
38. Machinery	1	7.14	1.20	187	8.35	1.24
39. Failure of ladder, scaffold, or other support	....	....	....	51	2.28	.34
40. Handling hot materials	1	7.14	1.20	60	2.68	.40
41. Other causes	1	7.14	1.20	584	26.07	3.87
Total	14	100.00	16.87	2,240	100.00	14.86
Grand total	83	....	100.00	15,080	....	100.00

METAL-MINE ACCIDENTS IN FOREIGN COUNTRIES.

Table 30 has been compiled from official reports of representative foreign countries in which mining is an important industry. The table shows the number of men employed in and about metal mines, the number killed, and the rate of fatalities per 1,000 men employed. It will be noted that the fatality rates are lower than those of metal mines in the United States. One reason for the difference is that for many years rigid inspection has been enforced in most of the important foreign mining countries. In the older nations, as Great Britain, Germany, and France, the majority of the miners have worked about mines from childhood, as did their fathers and grandfathers before them. Another reason is that in these countries the majority of the miners speak a common language, and there is comparatively little misunderstanding of orders given by mine officials. A common language is essential to safety in mining.

TABLE 30.—***FOREIGN COUNTRIES:*** *Men employed, and number killed, and number killed per 1,000 employed, in metal mines.*[a]

Country.	1910			1911			1912			1913			1914			1915			1916		
	Number employed.	Number killed.	Number killed per 1,000 employed.	Number employed.	Number killed.	Number killed per 1,000 employed.	Number employed.	Number killed.	Number killed per 1,000 employed.	Number employed.	Number killed.	Number killed per 1,000 employed.	Number employed.	Number killed.	Number killed per 1,000 employed.	Number employed.	Number killed.	Number killed per 1,000 employed.	Number employed.	Number killed.	Number killed per 1,000 employed.
Australasia:																					
New South Wales	19,369	29	1.50	19,360	35	1.81	19,807	31	1.57	19,914	30	1.51	17,493	26	1.49	13,190	14	1.06	14,412	21	2.42
New Zealand	8,121	15	1.85	7,400	5	.68	5,239	5	.95	4,941	10	2.02	4,470	6	1.34	4,205	10	2.38	3,713	9	2.42
Queensland	12,342	18	1.46	11,091	10	.90	10,608	26	2.45	9,978	11	1.10	7,853	9	1.15	7,113	10	1.41	7,008	8	1.14
Tasmania [b]	5,770	8	1.39	5,247	4	.76	5,566	53	9.52	6,106	6	.98	4,741	9	1.90	3,908	6	1.54	3,864	2	.52
Victoria	16.553	12	.72	14,051	19	1.35	11,856	16	1.35	11,931	9	.75	10,398	15	1.44	9,081	10	1.10	......	......	......
Western Australia	16,279	27	1.66	15,428	36	2.33	13,700	34	2.48	13,445	24	1.79	12,110	26	2.15	12,253	34	2.77	10,903	21	1.93
Austria	19,621	16	.82	19,934	10	.50	20,890	20	1.00	......	......	......	......	......	......	......	......	......	......	......	......
France	27,183	86	3.16	29,998	85	2.84	31,602	104	3.29	......	......	......	......	......	......	......	......	......	......	......	......
Germany	93,645	141	1.51	92,964	148	1.59	93,591	173	1.85	......	......	......	......	......	......	......	......	......	......	......	......
Great Britain [c]	28,676	43	1.50	29,025	43	1.48	28,058	43	1.53	27,412	32	1.16	23,709	24	1.01	19,831	21	1.06	19,455	23	1.18
Greece	6,933	9	1.30	6,764	14	2.07	6,180	12	1.94	......	......	......	......	......	......	......	......	......	......	......	......
Italy	49,995	59	1.18	49,498	117	2.36	48,225	71	1.47	47,497	108	2.93	46,412	60	1.29	......	......	......	......	......	......
Japan	84,728	118	1.39	80,896	142	1.76	81,921	129	1.57	......	......	......	......	......	......	......	......	......	......	......	......
Mexico [d]	......	......	......	36,641	265	7.23	12,678	39	3.08	......	......	......	......	......	......	......	......	......	......	......	......
Peru [d]	20,410	118	5.78	......	32	......	14,435	54	2.90	......	......	......	......	......	......	......	......	......	......	......	......
Portugal	6,554	11	1.68	7,484	10	1.34	7,769	7	.93	......	......	......	......	......	......	......	......	......	......	......	......
Russia	202,132	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Spain [e]	155,182	256	1.65	143,863	180	1.25	149,884	260	1.73	......	......	......	......	......	......	......	......	......	......	......	......
Sweden [f]	13,775	23	1.73	14,216	......	......	14,658	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Transvaal	205,687	882	4.29	225,538	934	4.14	240,000	900	3.75	223,380	851	3.81	......	665	......	235,192	718	3.05	249,864	742	2.97
United States	......	......	......	165,979	695	4.19	169,199	661	3.91	191,276	683	3.57	158,115	559	3.54	152,118	553	3.64	204,685	697	3.41

[a] Compiled from official reports.

[b] Figures for mines in Tasmania also cover coal mines and smelting works. The high rate for 1912 is due to one disastrous mine fire.

[c] Figures cover only mines coming under the "Metalliferous mines regulation act."

[d] Figures also cover coal mines.

[e] Figures also cover coal mines in which about 25,000 men are employed and metallurgical works employing about 25,000 men annually.

[f] Figures also cover coal mines and quarries.

ACCIDENTS AT METAL MINES IN CALIFORNIA, 1916.

The accompanying table gives the injuries and fatalities at lode and placer mines in California as reported by the California Industrial Accident Commission. These returns show a total of 5,046 nonfatal injuries and 52 fatalities as compared with 3,751 nonfatal injuries and 42 fatalities reported to the bureau by the operators. The difference is an indication of how compensation laws affect the reporting of accidents; the commission is backed by a State law, but the reports furnished to the bureau are voluntary. It is impossible to distribute these injuries on the bureau's accident schedule, by reason of the different nomenclature, as indicated in the column under causes. The bureau has, therefore, used the California returns as submitted by the operators, so that the data compiled would be on a comparable basis, so far as causes are concerned, with those from other States. The figures in the accompanying table are given, however, for the benefit of those who may desire a more complete total of fatal and nonfatal injuries for the State of California.

Accidents at California metal mines as reported by the Industrial Accident Commission, 1916.

Causes.	Lode mines.			Placers.		
	Injuries.		Fatalities.	Injuries.		Fatalities.
	Temporary.	Permanent.		Temporary.	Permanent.	
Machinery	207	21	4	44	5	1
Dangerous substances	566	10	17	62	....	....
Falling, rolling, flying objects	2,100	52	14	172	3	....
Personal falls	461	9	9	53	1	....
Animals	29	....	....	4	....	....
Collisions and derailments	483	15	5	35	1	....
Tools	372	2	1	44	....	....
Miscellaneous	224	1	....	29	....	....
Unknown	40	....	....	1	....	1
Total	**4,482**	**110**	**50**	**444**	**10**	**2**

FORM FOR MINE-ACCIDENT RECORDS.

In order that more detailed information may be had, the bureau prepared a form in 1915 for recording accidents at mines and metallurgical works, in the hope that many of the mining companies would consider its adoption. This form was presented with two objects in view: First, that more detailed information on different kinds of accidents may be obtained; and, second, that the adoption of the form will help to standardize the records.

Copies of this form will be supplied by the bureau with the understanding that a summary report will be made for the bureau's use at the close of the year.

PUBLICATIONS ON ACCIDENT STATISTICS.

A limited supply of the following publications of the Bureau of Mines has been printed and is available for free distribution until the edition is exhausted. Requests for all publications can not be granted, and to insure equitable distribution applicants are requested to limit their selection to publications that may be of especial interest to them. Requests for publications should be addressed to the Director, Bureau of Mines.

The Bureau of Mines issues a list showing all its publications available for free distribution as well as those obtainable only from the Superintendent of Documents, Government Printing Office, on payment of the price of printing. Interested persons should apply to the Director, Bureau of Mines, for a copy of the latest list.

PUBLICATIONS AVAILABLE FOR FREE DISTRIBUTION.

BULLETIN 115. Coal-mine fatalities in the United States, 1870–1914, with statistics of coal production, labor, and mining methods by States and calendar years, compiled by A. H. Fay. 1916. 370 pp., 3 pls., 13 figs.

TECHNICAL PAPER 46. Quarry accidents in the United States during the calendar year 1911, compiled by A. H. Fay. 1913. 32 pp.

TECHNICAL PAPER 61. Metal-mine accidents in the United States during the calendar year 1912, compiled by A. H. Fay. 1913. 76 pp., 1 fig.

TECHNICAL PAPER 92. Quarry accidents in the United States during the calendar year 1913, compiled by A. H. Fay. 1914. 76 pp.

TECHNICAL PAPER 118. Coke-oven accidents in the United States during the calendar years 1913 and 1914, compiled by A. H. Fay. 1915. 16 pp.

TECHNICAL PAPER 124. Accidents at metallurgical works in the United States during the calendar years 1913 and 1914, compiled by A. H. Fay. 1915. 28 pp.

TECHNICAL PAPER 128. Quarry accidents in the United States during the calendar year 1914, compiled by A. H. Fay. 1915. 45 pp.

TECHNICAL PAPER 129. Metal-mine accidents in the United States during the calendar year 1914, compiled by A. H. Fay. 1915. 96 pp., 1 pl., 3 figs.

TECHNICAL PAPER 151. Coke-oven accidents in the United States during the calendar year 1915, compiled by A. H. Fay. 1916. 18 pp.

TECHNICAL PAPER 164. Accidents at metallurgical works in the United States during the calendar year 1915, compiled by A. H. Fay. 1916. 20 pp.

TECHNICAL PAPER 165. Quarry accidents in the United States during the calendar year 1915, compiled by A. H. Fay. 1917. 77 pp., 1 pl.

TECHNICAL PAPER 168. Metal-mine accidents in the United States during the calendar year 1915, compiled by A. H. Fay. 1917. 114 pp., 2 figs.

TECHNICAL PAPER 173. Coke-oven accidents in the United States during the calendar year 1916, compiled by A. H. Fay. 1917. 22 pp.

Coal-mine fatalities in the United States, 1916, compiled by A. H. Fay. 1917. 42 pp.

PUBLICATIONS THAT MAY BE OBTAINED ONLY THROUGH THE SUPERINTENDENT OF DOCUMENTS.

Bulletin 69. Coal-mine accidents in the United States and foreign countries, compiled by F. W. Horton. 1913. 102 pp., 3 pls., 40 figs. 25 cents.

Technical Paper 27. Monthly statement of coal-mine accidents in the United States, January to August, 1912, and statistics for 1910 and 1911, compiled by F. W. Horton. 1912. 24 pp. 5 cents.

Technical Paper 40. Metal-mine accidents in the United States during the calendar year 1911, compiled by A. H. Fay. 1913. 54 pp. 5 cents.

Technical Paper 48. Coal-mine accidents in the United States, 1896–1912, with monthly statistics for 1912, by F. W. Horton. 1913. 74 pp., 10 figs. 10 cents.

Technical Paper 73. Quarry accidents in the United States during the calendar year 1912, compiled by A. H. Fay. 1914. 45 pp. 5 cents.

Technical Paper 94. Metal-mine accidents in the United States during the calendar year 1913, compiled by A. H. Fay. 1914. 73 pp. 10 cents.

Coal-mine fatalities in the United States during the calendar year 1915, with detailed figures for December, compiled by A. H. Fay. 1916. 80 pp., 3 figs. 10 cents.

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